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THE INDUSTRIALIST.

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THE POET WORDSWORTH.

WILLIAM WORDSWORTH, a great English poet, whose works grew very slowly into favor, but finally have come to be estimated among the most precious literary legacies bequeathed to the nineteenth century, was born in 1770 and died in 1850.

In appearance Wordsworth is described as being a "hardy Cumbrian mountaineer," with the temperament of a thoroughly frugal peasant and a personal gift of discovering the deepest springs of joy in what ordinary men either took as a matter of fact or found uninteresting or full of pain. He evidently was a very plain looking man, even almost to awkward ugliness, especially when walking and viewed from the back, as he had a one-sided, shacking, hitching gait that was likely to crowd another out of the path.

At seventeen years of age he entered St. John's College, Cambridge, and while there actually assumed the attitude of a dandy, wearing silk stockings, powdering his hair, and priding himself generally on his gentlemanly habits. It is said of him that he once, but only once in his life, was the worse for liquor, the occasion being his celebration of his first visit to rooms, at Christ's College, once occupied by Milton.

During the summer vacation at St. John's College, Wordsworth took an excursion to Switzerland and passing through Austrian Flanders, up the Rhine and crossing the Great St. Bernard, he visited Lake Como and other scenes iu Italy. Soon after this the French Revolution broke out and Wordsworth spent about a year in Paris, choosing friends so carelessly that he was even looked upon as a spy. About this time it became too close quarters for the English, and his supplies being cut off he, with others, fled home. He then spent a year in London "overwhelmed with shame and despondency for the disgrace brought upon Liberty by the atrocities committed in that holy name," but hearing of

the death of Robespierre, he shouted a thanksgiving for such a "vindication of eternal justice."

His highly honored and worthy sister, Dorothy, always stayed with him at their home, and it was here that Miss Mary Hutchinson visited her cousins, the Wordsworths, a visit which ended in the marriage of Miss Hutchinson and Wordsworth about the beginning of the nineteenth century. From this time fortune smiled on him, making it possible for him to devote his undivided attention to his ever-beloved work. About this time he formed with Coleridge an acquaintance which proved to be a lasting friendship.

His natural inclinations, which seem in a measure to account for his lack of humor, were toward hardness, which to a great extent was overcome by the influence of his dutiful sister, who led him to more delicate and sensitive thoughts.

> "She gave me eyes, she gave me ears,
> And humble cares and delicate fears;
> A heart, the fountain of sweet tears,
> And love, and thought and joys."

Wordsworth is preëminently the poet of reflective imagination and originality. Although his poetry seems so meditative, yet no poet was so little a dreamer as he; neither was he a poet of reveries. He was solitary because his imaginations were directed by influences from within, which were always stronger than those from without. He was essentially the poet of nature. It might be said that "nature not only gave him the matter for his poems, but wrote them for him with her own penetrating power." He had no assumed poetic style of his own and believed that there is no such thing as poetic diction. He chose very simple subjects and characters for his poems, and some were so simple that they were even unpoetical. No poet ever equaled him in drawing from such common sources nor made so much out of so little.

The genius of Wordsworth lay mainly in detecting nature's influences just at the point where they were stealing unobserved into the very essence of the human soul. His characteristic power lay no less in discovering divine influences, as they fall "like dew upon the spirit." As an eminent critic has said, "Strike out the human element from his nature poems and they lose all their meaning. He did not paint nature like Tennyson; he interpreted its spiritual expressions." He can never be said to

have identified nature with either man or God, for "freedom, immortality and a spiritual God were of the very essence of his own meditative world."

Wordsworth seemed to gaze into the depths of his own heart, nature, and God. He always enjoyed to the fullest extent the anticipation of anything, and as one has said, "gathered up the crumbs before beginning on the loaf." This trait is exemplified in his poems on "Yarrow" and the verses on the "Strawberry Blossom."

His entire devotion to poetry as a study and life's work dated from 1794 or '95. He was a profuse writer, having composed verses during a period of about sixty years, of which he was in his golden prime only about ten years, from 1798 to 1808; but he is great only for the really fine things which he has written. Of his many sonnets, some three hundred or more, not more than forty-five are really worthy of notice. Among his best writings are "Tintern Abbey," "Ode on Intimations of Immortality," his three poems on "Yarrow," the "Fountain," "The Solitary Reaper," "Ode to Duty," "To the Daisy," "The Daffodils," his ballads "Lucy Gray," and "We Are Seven," and among his sonnets we have "The World is Too Much With Us," "Milton," and "The Sonnet."

INA E. HOLROYD.

NOTE ON INDUCTION IN IRON.

AS AN answer to some of the questions which are frequently asked by students and amateur electricians concerning the best kinds of iron to use in building dynamos, motors, transformers, and induction coils, the following general statements are made with the hope that these facts may be of service to a few.

To get a maximum induction with a given magnetizing force, some kind of soft iron is necessary. As a rule, the amateur builder of a small dynamo or motor does not care to use a larger quantity of insulated copper wire than is absolutely essential. Two reasons for this are evident: first, the cost of construction must be kept as low as possible; second, the space occupied by the wire should be as small as possible. Three forms of iron are therefore commonly used, viz., wrought iron, soft steel, and cast-iron. In the last named the saturation point is reached at a lower value of the induction than in any of the others; and in the first named the saturation point is attained at a value of the induction

higher than any other. In general, aside from the original cost, wrought iron is therefore the best kind of iron to use for field or armature cores of dynamos, motors, or transformers. Because it is less expensive, soft steel is frequently used.

In common practice, however, the maximum value of induction in wrought iron and mild steel ranges between fifteen and eighteen thousand centimeter-gram-second lines of force per square centimeter while the maximum value of the induction in cast-iron is approximately eight to ten thousand lines per square centimeter. In the case of one specimen of soft iron tested by Ewing, he succeeded in forcing more than forty-five thousand lines per square centimeter through the iron, but to do this an excessive value of the magnetizing force was required.

In general, impurities in iron lower its permeability. The presence of carbon in steel and cast-iron, for instance, reduces their permeability very markedly. Uncombined carbon in iron reduces the permeability more than carbon in chemical combination. Tempering the metal or chilling the casting will also reduce the permeability. On the other hand, the presence of a limited amount of aluminum or silicon, say one or two per cent, increases the permeability. This probably is due to the fact that the iron is thus rendered softer and more homogeneous.

L. W. HARTMAN.

THOREAU.

NO TOWN in New England is so loved by the student of literature as the little town of Concord. A light seems to radiate from it, for here as a centre was gathered at one time a cluster of our brightest literary men. Here Channing wrote his poetry, which has a charm for both the scholar and the laborer; here Emerson, in the "Old Manse," wrote his essay on "Nature," and here, later, Hawthorne sat in the same room in the Manse and wrote his "Mosses;" but the man who belongs most distinctively to Concord, because there he was born, lived most of his life, and died, is the "poet naturalist," Henry David Thoreau.

He was born in 1817. His father, though a poor pencil maker, was able to help his son through Harvard. Henry when quite young learned the trade of his father, and as he whittled away at pencils he was no doubt whittling and shaping thoughts into good form, for it is the nicety of expression as much as anything else that gives to all his works a special charm.

He was a rare and rugged child of nature. He loved to roam about the country near his home. The ample farmhouses dotted here and there over Concord and the adjoining country spoke of genial hospitality. Thoreau came to know the inside of most of them, and as he talked with the owners he learned, as Wordsworth did, the true meaning of "plain living and high thinking." He made this a principle of his life. He became a vegetarian; he drank nothing but water; he cared for the society of but a few, and when he wanted to think great thoughts he retired from civilization and lived alone with nature.

Walden Lake is near to Concord. As a boy he often drove past this picturesque spot with his mother, on visits to his relatives. He longed to stop and explore both woods and water, but it was not until he was a man that he was able to do this. When he was about twenty-eight he purchased of Mr. Emerson a bit of the woodland along the margin of the lake. Borrowing, one day, an axe of Mr. Alcott he started to the woods to build a hut. He had decided to have a new home. With his own hands he hewed the logs and built his house. It was a rude affair consisting of one room, ten by fifteen feet. Here he lived for two years, alone with nature, visited occasionally by his Concord friends. He said he had retired from social life and chosen this mode of living so that he could transact some private business. His object was to write a book. He had spent a week exploring the country along the Concord and Merrimac Rivers and he wanted to tell of his experience. The book, however, was not a success, and when he settled with his publishers he took back more than half of them. He carefully put them on his book shelves and made this entry in his diary; "I have now a library of nearly nine hundred volumes, over seven hundred of which I wrote myself." He was not daunted, however, by this failure, and a summer spent in the woods of Maine among the Indians was the worthy theme of another book.

He is best known by his "Walden," a book telling of his sojourn in the woods. This book is alive with nature and life. He pictures vividly his home and manner of living while at Walden. He did not lack for companions. His fireplace was his good housekeeper, that kept the room warm and cheerful. The second winter, after he got a cook-stove, he was lonely, for he could not then see the face of his fire, and he felt that his companion had left him.

He enjoyed the friendship of the seasons, and when the rain visited him human companionship seemed unnecessary. He felt the presence of something kindred to him in scenes that to many would seem lonely and dreary. He tells us that while at Walden he formed the closest intimacy with all life around him. 'Tis said as he sat motionless on a stump by the lake a woodchuck or a squirrel would come up to him to claim his acquaintance. The partridges would light on his shoulder and the fishes would even swim into his hand.

Thoreau was always on the side of right. At one time he refused to pay his taxes to the state because he felt by so doing he was advocating slavery. For this he was sent to jail. When Emerson visited him in his cell he said: "Henry, why are you here?" Thoreau replied: "Why are you not here?" After the defeat of John Brown he boldly eulogized the martyr and spoke in defense of the cause John Brown represented.

There was always the kindest feeling between Emerson and Thoreau, and when Thoreau was laid to rest in the Sleepy Hollow cemetery it was Emerson who delivered the funeral address. On that occasion he said in speaking of Thoreau: "A truth speaker he. . . . His soul was made for the noblest society; he had in a short life exhausted the capabilities of this world; wherever there is knowledge, wherever there is virtue, wherever there is beauty, he will find a home."

Henry Thoreau's monument is not where his body rests. A pile of stones carried from the shore of the lake, by tourists and lovers of his works, marks the spot in Walden where his hut once stood. This is his monument.

As master of the English language he has few superiors. He always packed into his well-formed phrases a truth which he thought would be helpful to his fellows. He says: "Be not simply good—be good for something." "Read the best books first, or you may not have a chance to read them at all." "What a man thinks of himself, that it is which determines or rather indicates his fate," and he gives his philosophy when he says, "a man is rich in proportion to the number of things which he can afford to let alone."

MARY E. BERRY.

The dining-hall department of the Students' Coöperative Association will not run for the present.

ERGOTISM.

(Press Bulletin No. 117, issued by Veterinary Department.)

During the present season, owing to the heavy rainfall or other climatic conditions, there has been developed upon wild rye and other similar grasses a fungus known as ergot, commonly called "spurred rye." Within the past few weeks a number of complaints have been received at the Kansas Experiment Station from the eastern and central parts of the State indicating that injurious and fatal results have occurred among stock from eating this fungus.

Ergotism is a disease of animals caused by eating ergot either on pasture grasses or hay. Ergot is a parasitic fungus (*Claviceps purpura*) that develops on the heads of wild rye, redtop, and similar grasses. This fungus replaces the ordinary seed or grain with a black or brown-black grain much longer than the ordinary rye grain, cylindrical, pointed, and slightly curved. The number of grains of ergot in a single head of rye or grass will vary from one to a dozen or more. The grains of ergot can be easily recognized by their shape and color. There is no dust or smut upon the heads of grain as there is with some fungi. Ergot does not attack corn or sorghum.

Outbreaks of ergotism occur nearly all over the world and often cause heavy losses among cattle and horses. Serious losses from ergot in this State have not occurred since 1884, but it is possible that owing to the abundance of ergot upon grasses the present season, serious loss may follow unless care is exercised to prevent feeding a large amount of ergot. Cold weather and a limited supply of drinking water seem to favor the development of ergotism.

Symptoms.—The symptoms of ergotism may occur at once after eating the fungus, provided the animal gets a sufficient quantity; or they may occur only after the animal has eaten the fungus for some time. Ergot lessens the blood supply, especially in the extremities—feet, tail and ears—the affected parts swell, get cold, a well-defined line usually forms about the part, below which the tissue dies and sloughs off. When the feet are attacked the animal becomes very lame. Ergot causes abortion in pregnant animals, but this must not be confounded with contagious abortion among cattle. Ergot also affects the nervous system, causing trembling of the muscles, weakness, staggering gait, and sometimes convulsions. The digestive system is often affected and there may be purging, indigestion and abdominal pain. Cattle are more seriously affected by ergot than horses.

Treatment.—To prevent the disease, do not feed animals hay or grass containing ergot, and when the disease occurs ergot should be witheld at once. A purge of one pound of epsom salts for adult cattle, or a quart of raw linseed oil for horses, should be given. Give sloppy, nutritious foods with plenty of drinking water. Bathe affected parts, feet, etc., with hot water, rubbing to stimulate circulation, and apply antiseptics such as a five per cent solution of carbolic acid.

Suspected specimens of ergot may be sent to the Botanical or Veterinary Department, Agricultural College, Manhattan, Kansas, for identification. Hay that has been cut early is less apt to contain ergot than late-cut hay.

Manhattan, Kan., Sept. 18, 1902. N. S. MAYO.

The Dairy Department has been experimenting with various kinds of fly repellents during the summer.

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PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

The Farm Department is harvesting cow-peas and soy-beans.

Fifty farmers' institutes were held or arranged for since the first of July.

The Board of Regents will meet at the College on Thursday, September 25.

Professor McKeever's family are the happy recipients of a new Bush & Gerts piano.

The Farm and Dairy Departments have seeded wheat and rye for late fall and early spring pasture.

Professor and Mrs. McCormick will be settled in their new home on Pierre street in a few weeks.

Dr. C. M. Brink, the new professor of English, is rooming at 815 Houston street, with the family of Mr. Thoes.

Prof. W. O. Clure and family have moved into the new cottage lately erected by H. Pfuetze, on Fremont street.

The Department of Dairy Husbandry is arranging for a series of tests with the different makes of hand separators.

Mrs. Harris, mother of Eleanor Harris, assistant in music, has moved from Chicago to Manhattan, and will take charge of the Dewey dormitories.

The College raised an immense crop of German millet this year. Samples procured at the time of cutting measured six feet nine inches in height.

Professor Cottrell writes that he has received a $12,000 appropriation with which to build a modern dairy barn that will hold two hundred head of cattle.—*Students' Herald.*

Prof. and Mrs. B. S. McFarland came the first of the week and are settled in their old quarters at the corner of Fourth and Colorado. The professor looks hale and bright and reports a good crop on his farm in Johnson county.

The most conspicuous new improvement on the north part of the farm is a towering round silo with an ornamental conic roof. The silo has a diameter of sixteen feet and a height of nearly thirty feet and holds 92½ tons of ensilage. It is filled to the brim with a superior article of corn and Kafir-corn.

The experimental tables of the new Physical Science Hall were built during the vacation by the Mechanical Department. The work required several thousand feet of lumber and included the construction of a mountain of drawers.

Mr. Charles Hughes, private secretary to President Nichols, was recently awarded the first prize of $20, by the Chicago Correspondenee School of Law, for having written the best thesis on the subject, "The Basis of American Law."—*Jayhawker.*

Prof. J. D. Walters delivered an address on "Landscape Gardening" before the Wathena Chautauqua, August 19, to an appreciative audience. His talk was so well received that he gave another, by request of the managers, on the following day.—*Jayhawker.*

We are in receipt of a well-written and neatly illustrated separatum from the last year-book of the department of agriculture, on "The Timber Resources of Nebraska," written by William L. Hall, '98, superintendent of tree planting, United States bureau of forestry.

It will be interesting to old-time students to know that Professor Boyd, ex-professor of history in K. S. A. C., has been adopted by an uncle in Germany and has changed his name to Lawrence Boyd Evans, but is still teaching in Tuft's College, Boston.—*Students' Herald.*

Miss Lois Deming returned, after spending a month at home, Larkin, to continue her work in Dr. Mayo's office. Her arm, which was broken in falling from her bicycle in a collision with a pedestrian, is healing nicely. A sister came with her to attend the city schools.—*Jayhawker.*

Senior student, H. B. Holroyd, has spent the summer in the employ of the United States bureau of forestry, doing field work in the foot hills of the Sierras of California. In a letter to Professor Walters, dated Willwood, Cal., September 14, he says that he expects to be back at the College desk in about four weeks.

The Farm Department has been conducting an interesting experiment in testing the value of pasture for growing pigs. The thirty head under experiment all receive a mixture of shorts, corn and Kafir-corn as a grain ration. One third of these hogs receive no pasture, one-third rape pasture and the others alfalfa pasture.

The College came very near losing its executive head last month. Pres. E. R. Nichols received a call to the presidency of the State Agricultural College of Rhode Island, at a greatly increased salary. He went to Kingston, where the college is located, examined into the condition and prospects of the institution and concluded to remain with his work in Kansas. The College—Faculty, students and members of the Board of Regents—rejoice in his decision.

Hon. J. T. Ellicott, ex-regent of the Agricultural College ('83–'86), was here shaking hands with his old friends last Tuesday. He had not been here for ten years and was greatly surprised at the growth of the institution and the general improvement of the city. Mr. Ellicott is connected with the management of the Harvey railroad hotels located throughout the West.

Short biographical sketches of Prof. Clark M. Brink, Ph. D., who has been elected to the chair of English, and Prof. C. L. Barnes, D. V. M., who has been chosen assistant veterinarian to fill the vacancy due to the resignation of Mr. Kinsley, will be published next week. Both men come to us well recommended and both have taken hold of their new work with energy and tact.

The brick walk on Moro, between Tenth street and Manhattan avenue, is being laid. This will finish the brick walk from the heart of the city to the corner of the College grounds, and a person can have a walk any time he wishes it without going into the mud. The city has been doing much for the convenience and comfort of the students in the last few years and the student body feels sincerely grateful for the favors.—*Students' Herald.*

Engineer J. Lund has been busy all summer with the construction of steam-pipe lines from the powerhouse to the new Physical Science Hall and Agricultural Hall. The work is well along and he hopes to be able to test the new heating apparatus of the Science Hall in a few days. The pipe line passes through a tunnel about four hundred feet long and twenty feet under the surface of the campus. The tunnel was dug last year under the direction of Professor Walters.

The Military Department, which has been in the care of student instructors since the breaking out of the Spanish war, will this year again be under the management of a detailed officer of the regular United States army. Captain Andrew Rowan, of the Nineteenth United States Infantry, has been ordered here to instruct in military science and tactics. Rowan was the lieutenant detailed by the government to carry "A Message to Garcia," prior to the Spanish-American War. The captain will be here in a few days.

The committees on examination and assignment have been laboring ever since last Tuesday to take care of the host of new and old students who have thronged their offices by dozens and hundreds. The classes met on Friday and Saturday at the regular schedule time, yet many students are still to be examined for advanced standing. Many have not been able to get the promised credentials from schools where they attended formerly, and many are still coming in, having been delayed for some reason or other. That the attendence will be far over last year's figures is evident at this writing, and this is about all we can say at present. Another week will enable us to give exact figures. The next INDUSTRIALIST will give a comparative statement by classes and years.

The Manhattan *Nationalist* says: "The College may safely look forward to a prosperous year. The members of the teaching force are all on hand with the exception of a professor of agriculture, who will be elected when the Board of Regents meets next Thursday. Every one, from the President to the student assistants, is enthusiastic and ready for work. The equipment of the College is now improved by the readiness for use of the new physics and chemistry building. The fine new reading-room for the library will also be opened next week."

The Departments of Physics and Chemistry are now domiciled in their new quarters in the Physical Science Hall. After many years of hoping, waiting and planning they have at last been provided with a "local habitation." The new building is a model of convenience, simple, hygienic arrangements and pleasing, substantial architecture. Much of the needed furniture and apparatus cannot be procured till the legislature makes additional appropriations, but the two departments are in better shape now than ever before. Contractor C. A. Fellows, of Topeka, who built the hall, has done well and everybody is proud of the stately structure. We believe that the State never before obtained such a solid building at such a price per cubic foot of space.

Prospects at the present time indicate that the College will have a strong football squad. C. E. Deitz, a coach of the Northwestern University, is training the men this season. About thirty have been on the field for practice, including nearly all of last year's team. The merchants of the city have subscribed for a liberal financial support. The schedule includes the leading state institutions of Kansas, Missouri and Nebraska. Among the men who will try for their old positions are: Sidorfsky, Clarke, Beach and Haggmann, tackle; Ryan and DeArmond, center; Neilsen and Minis, end; Towne and Cassell, half; Steinhour and Margrave, guard; Chase, quarter. The new men are Thompson, of Washington state, Nash, Milner and Schmitz. The team will have a new equipment of material, sweaters, etc.

The following item has been culled from No. 9, Vol. I, of the *Gridley Star*, Frank Fockele, publisher; Glick Fockele, editor. The paragraph has the right loyal ring to it and we assure our young editor that it is being appreciated at his alma mater: "As the time for the fall terms to open at different institutions approaches, a great many boys and girls over the county think 'where shall I go to school?' To any in this vicinity who have contemplated the State Agricultural College, at Manhattan, we would say 'call on us and talk it over.' We have a catalogue at the office which is full of illustrations and information about the College work. To any boy of ordinary caliber, good, solid farmer boys preferred, the Agricultural College offers splendid courses in agriculture, mechanical or electrical engineering, and general science. The last named is also open to young ladies, as is also the course in domestic science. It is undoubtedly the most practical institution of the West."

The Board, at their Commencement meeting, appointed a committee consisting of Regents J. S. McDowell and E. T. Fairchild to visit a number of the foremost agricultural colleges and select a professor of agriculture. The committee, accompanied by President E. R. Nichols, visited the Iowa State Agricultural College, at Ames, the Ohio State Agricultural College, at Columbus, and the New York State Agricultural College, at Ithaca. President Nichols went also to Lansing to examine into the work of the Agricultural College of Michigan. The selection of an available man for this important chair will probably be made at the meeting of the Board this week.

The Agricultural College has now two student magazines, the *Herald*, which appears weekly during College and is publishing its eighth volume, and the *Jayhawker*, which appeared for the first time during the past vacation and of which we have before us the second number. The *Herald* needs no introduction. It has a large subscription list and we are glad to report that it is a good and newsy paper. It stands loyally by the Agricultural College in every issue. The *Jayhawker* is a semi-quarterly of thirty-two pages and colored cover, handsomely printed and well written. The number before us is a typographical beauty and full of timely matter. We bespeak for it a liberal patronage among the friends of the College. The subscription price is fifty cents a year.

The new addition to the library building, or Fairchild Hall, as it will be called in the future, is nearly completed. The stonework, the roofing and the plastering are finished, and the carpenters and painters are working on the last touches. The contract called for the delivery of the job by September 1, but the unusually wet weather and impassable roads delayed the stonework for weeks at a time. It is expected now that the classes that are to occupy the second floor will be able to move into their quarters by the close of the present week and that the large reading-room on the first floor may be opened by Tuesday. The addition adds much-needed room to the Hall and completes its outside appearance toward the west.

ALUMNI AND FORMER STUDENTS.

Miss Mary C. Lee, '89, is taking a course of study at Pratt Institute.

W. L. Harvey, '02, is candidate for superintendent of public instruction of Seward county.

Dr. G. W. Smith, '93, has located at Manhattan, Kan., having purchased the medical practice of Hancock and Hancock.

Dr. O. A. Stingley, '96, has been appointed assistant inspector in the Bureau of Animal Industry, with duties at Chicago.

George D. Knipe, second-year in 1880, and for a number of years superintendent of schools in Manhattan, has been made professor of pedagogy in the Oklahoma Normal School, at Alva.

F. E. Johnson, '99, after spending a year in graduate work here, has gone to Kansas City to take a course in veterinary medicine.

Isabella Symns, second-year in 1897, was married the latter part of June to B. W. Reeder, an attorney, of Troy, Kan. They spent a month in Colorado and are now at home in Troy.

John Purcell, second-year in 1893, and Edythe Cardwell, second-year in 1901, were married at the home of the bride's parents, at Osage City, July 23. They will live at the corner of Juliette and Leavenworth.

H. F. Butterfield, '01, has been elected instructor in manual training for the schools of Pittsburg, Kan. Mr. Butterfield has spent the summer working in the shops and is well prepared to perform the duties of his position.

R. S. Kellogg, '96, and Miss Clara Fry, of Bentonville, Ark., were married August 30. They are at home at Fay, Kan. Mr. Kellogg is still in the employ of the bureau of forestry, but his duties are such as permit him to be at his old home this winter.

C. S. Evans, '96, visited the College during the summer. He studied medicine two years in the medical department of the Kentucky University and completed a course for the degree of M. D. in another year at the University Medical College, Kansas City, Mo.

Glick Fockele, '02, has hitched his wagon to a star, the *Gridley Star*, Vol. I, No. 1, being issued July 11. Mr. Fockele is making a readable paper and incidentally is saying good words for the College. With his ability and push, he will doubtless make a success.

Prof. F. A. Waugh, '91, who has filled the chair of horticulture in the Vermont State University with such distinguished success for a number of years, has been elected to a similar position in the Massachusetts Agricultural College, at a considerable increase in salary.

Mr. B. R. Brown [third-year, 1900], of this city, was married to Miss Jessie Mae Davis, of New York City, at Gibbon, Neb., August 26, at five o'clock P. M. The Rev. F. A. Mitchell, of the Presbyterian church, officiated. Mr. Brown is now proprietor of the Commercial Hotel, at Shelton, Neb.—*Nationalist.*

A. T. Kinsley, '99, has resigned his position as assistant in veterinary science to make a further study of the subject in Kansas City, where he expects to take the doctor's degree. Mr. Kinsley has made an exceptionally efficient assistant and leaves because of the desire to fit himself for better things.

W. E. Mathewson, '01, after a year of most acceptable service as assistant in chemistry, has resigned his position and will take up the study of medicine. At present he is in the employ of the bureau of chemistry, United States department of agriculture, as a sugar expert in some investigations which the bureau is conducting in the manufacture of table sirup from sorghum. He is stationed at Iola and Fort Scott.

The marriage of Miss Edith M. Schorer [second-year, 1902], of Clyde, and George W. Haulenbeck, of this city, was solemnized at nine o'clock Wednesday morning by Rev. Fisher. The bride has been a student at the Agricultural College for the past two years. Mr. and Mrs. Haulenbeck returned to Manhattan yesterday, where they will make their future home.—*Nationalist.*

The following births have come to the notice of the editor: Mark A. Carleton, '87, and wife, a son, August 7. D. H. Otis, '92, and Mary Lyman-Otis, '94, a son. E. H. Webster, '96, and Nora Fryhofer-Webster, '96, a daughter, August 31. R. W. Clothier, '97, and Elizabeth Blachly-Clothier, second-year in 1898, a son. L. B. Jolley, '01, and Bertha Evans-Jolley, first-year in 1898, a daughter. E. M. Haise, second-year in 1896, and Louisa Maelzer-Haise, '99, a son.

Dr. E. C. Joss and Miriam Swingle, of the class of '96, were married at the home of the bride's parents, August 13. Miss Swingle had been assistant in domestic science at Bradley Polytechnic Institute for several years. Dr. Joss recently graduated from the Chicago Veterinary College, and has been appointed assistant veterinarian in the Washington State Agricultural College. at Pullman. Only a few guests were invited to the wedding, but a large reception was held in their honor later.

Miss Gertrude Coburn, '91, daughter of Regent Coburn. has been appointed to the professorship of domestic science at Bradley Polytechnic Institute, Peoria, Ill., lately made vacant by the resignation of Miss Bertha Spohr, '98. For four years she had charge of the domestic science work at the Stout Manual Training School, at Menominee, Wis., and later served four years in a like capacity in the Iowa Agricultural College. She has lately installed a domestic science department in the Girls' Industrial School, at Beloit, under an appropriation made by the State. She will, in her new position, continue to reflect credit upon her alma mater.

A telegram received at Manhattan, August 17, announces the accidental death by drowning of Lieut. Ralph McDowell [second-year, 1889], which occurred at Fort Clark, Texas, on Saturday. Young McDowell was swimming with a number of companions from his company and is supposed to have been seized with cramps. The body will be brought to this city for interment. Lieutenant McDowell was a son of Gen. J. S. McDowell, one of the best known citizens of the Sunflower State. He saw active service in the Philippines as a member of the famous Twentieth Kansas, in C company. He re-enlisted in the Eleventh Volunteer Cavalry, organized exclusively for the Philippine service. He was mustered out of this company as a sergeant. Upon his return to this country, he re-enlisted as a private in the Twelfth Cavalry and, later, was commissioned as a second lieutenant, being stationed at Fort Clark. Young McDowell was highly esteemed here, where he lived for many years, and the news of his sudden death was a profound shock to the community.—*Topeka Herald.*

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THE INDUSTRIALIST.

VOL. 29. MANHATTAN, KAN., SEPTEMBER 30, 1902. NO. 2

THE MODERN COUNTRY PRINTING-OFFICE.

IN taking up the discussion of the modern country printing-office we shall not only speak of the office itself and of the equipment, but shall also outline what we consider the most important features in operating the office at a profit—the kind of workmen to employ and their duty to their employer. If any there are who will criticise the plan presented because of its "enormous cost," we would respectfully refer them to the old saying that "to make money one must spend money." Printing material comes high, and the person who has a few hundred dollars may start into the business moderately at first, and by close attention to business and the application of business principles may gradually add to his first instalment, and in a few years will be surprised at the amount of equipment accumulated.

The plan presented provides for an office for a town of from three to five thousand inhabitants, though it may be reduced proportionately to accommodate a smaller town or a person with less means at his command. But in *any* office our "rules and regulations" may be profitably employed.

Few buildings are constructed with a view to being used for a printing-office. If a suitable building cannot be found, almost any bright newspaper man can find some one who will be willing to erect a good, substantial and properly arranged building by taking a long-time lease on it. The building should face the south, with an alley on one side. The plan presented is a south front, fifty by seventy-five feet, with an alley on the west. In the southeast corner is the general business office, twenty by twenty feet, provided with desk, exchange editor's and reporter's tables, an exchange table, an exchange rack or file, and a case for keeping samples of work and light stock. To the west of this is the editor's private room, ten by fourteen feet, provided with desk, bookcase, dictionaries and other books of reference. Next on the west is the stock-room, twenty by twenty feet, with double doors

opening on the alley to admit of unloading heavy stock. In here is the paper-cutter. The space in the rear of the editor's private room and between the general office and stock room, six by ten feet, is taken up with toilet room and wardrobe.

In the rear of all this is the printing-office proper, fifty by fifty-five feet. The door of this room should always be kept closed and fastened with some sort of a contrivance not easily manipulated by one not familiar with the combination. The foreman's desk is near this door. This makes him handy when wanted in the business office, and he is in a position to stop any intruders from entering the work room. Near him, and along the west wall, are the news and book racks, and close to the latter are the dumps. On the end of each dump should be slides for galleys. Immediately back of the two end dumps are galley racks, and back of the middle dump and between the galley racks is the proof-press. Near the galley racks are the book and news imposing stones, under which may be built stalls for chases and racks for furniture. These stones are as near the cylinder press as can be easily arranged, leaving the stones as near the galley racks as possible and the presses near the window and as far from the compositors as possible. A make-up rack should be near the book stone and the dump, which should be given prominence in proportion to its needs.

The job racks are arranged along the north wall, and facing them are the job cabinets. Back of the latter is a lead-and-slug rack and a rule rack, while close by is the job stone. Under the job stone should be stalls for the different sizes of job galleys. Between the job stone and the job presses is the furniture rack and job lock-up stone. Under the stone is made slides for the chases. The work-bench, on which is fastened a vice, the lead-and-rule cutter, the mitering machine, drawers for the tools, and other paraphernalia belonging thereto. In the extreme northwest corner is a toilet room for employes, where should always be kept plenty of soap, clean towels, and hand brushes.

A drying rack for job-work is placed close to the job presses, and near the cylinder press is the folding table. If a folding machine is used, it may take the place of the table. A place for washing forms should be arranged where most convenient.

It will be noticed by studying the plan that the employes are required to move about the room but very little, and that the var-

ious "departments" are so arranged as not to conflict with each other.

All racks, dumps, stones, cabinets, etc., should be so built as to allow sweeping under them, or should be set flat on the floor, or be built around the lower edges, so that no dirt and trash could accumulate under them.

The light in a printing-office is a most important matter. The arrangement should be so that each compositor could have a left-handed light, and he should never face a window unless a reasonable distance from it. Light on the presses should come from the gear side. Nearly every small country town nowadays has an electric plant, and an office should be wired ready for good lighting in case of a rush of work compelling night work or on a dull, gloomy day. Many offices depend entirely on a few sadly neglected lamps laying around, which are always dangerous and unsatisfactory, and time enough is lost in "digging them up" and in loss of work on account of their poor service to pay for good light. After a building is once wired the electric light is cheaper than oil. Strong lamps should be secured, and if hung on long cables can be strung on wires stretched across the room over cases, stones, etc., so as to be slid along to the place where most needed.

Employes should always be attentive to their work, keeping in mind the fact that employers cannot make money and pay good wages without the assistance and coöperation of his men. They should assist in keeping the office trim and neat. Boxes or barrels should be placed convenient to presses, paper cutter, proof-press, etc., and employes *compelled* to throw scraps and waste in them. Assist the office boy to keep clean, and then insist on him doing his work properly. An office should be swept clean at least once a day, and should be mopped often enough so that when swept a cloud of dust will not fill the room and settle on presses, in cases, and on stones. Tobacco may not be prohibited but should be restricted, each person using it being required to keep a cuspidore and keep it clean, not forcing the office boy to do such disagreeable work. Spitting on the floor should be prohibited. All persons connected with the office should be careful not to carry in a surplus of mud on their feet.

Each employe should consider it his duty to help keep the office in proper shape. There should be a "place for everything and

everything in its place." To lay things around promiscuously only requires some one to follow you up, picking up after you, or a loss of time in looking for misplaced articles when needed. Type should never be allowed to lay on the floor, but picked up as soon as dropped. "If you drop a type, stoop and pick up two."

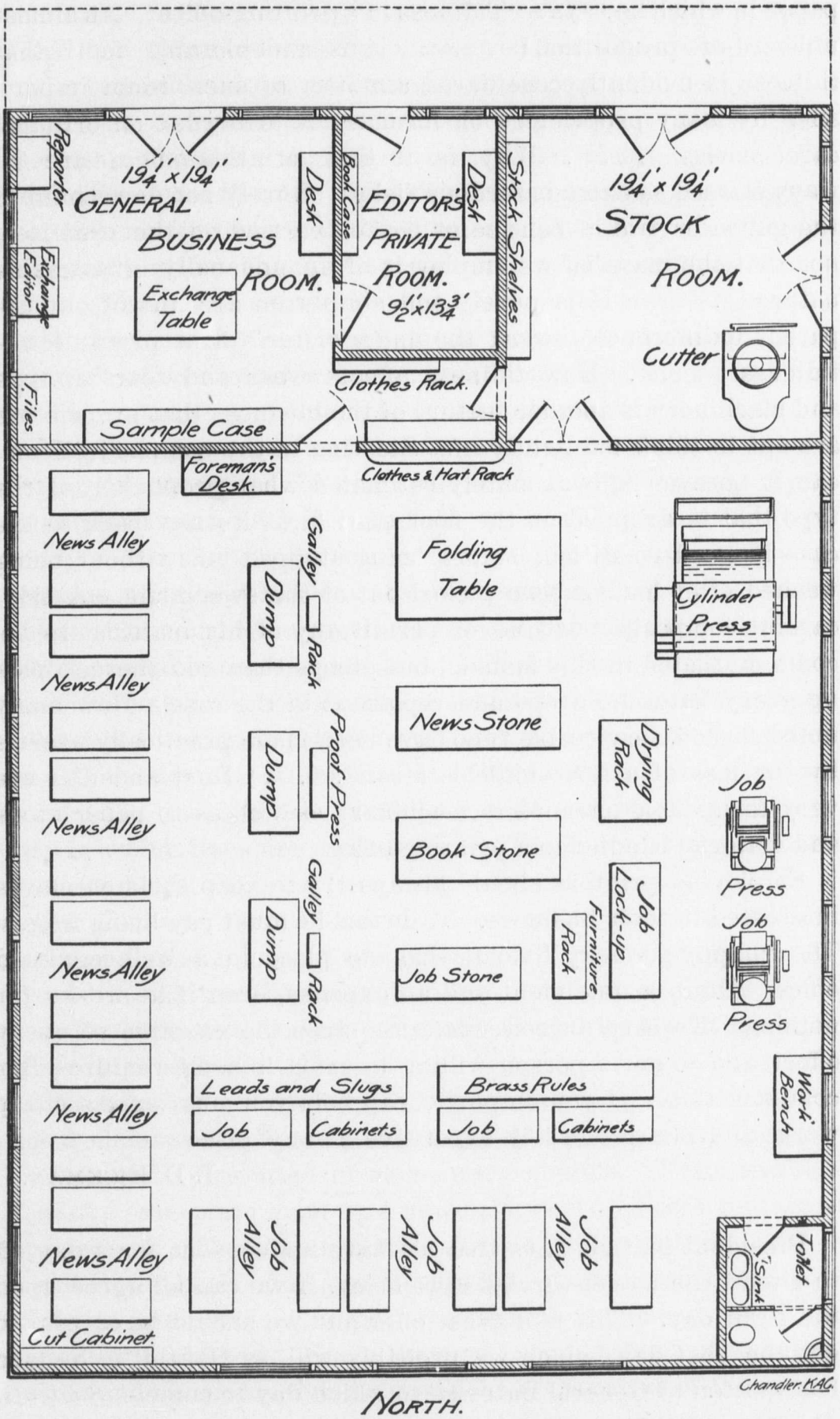
There is quite a loss in careless distribution of job type, especially in light faces. Job type, and especially if it is heavy, should be *laid* in the case, not *thrown* in. If the hair lines strike the corner of a letter, it will probably nick. Before distributing, forms should be washed thoroughly, and rinced. The writer is of the opinion, after using many of the patent washes, that the old-style lye kettle is the cheapest and best, and after its use thorough drenching will carry away all dirt. Gasoline is a good wash after taking proofs; but before type is put into the cases it should be thoroughly washed. All rules should be wiped off with a rag saturated with gasoline.

After a job has been run, the disk and rollers should be washed while the ink is soft. They may be washed with coal-oil, leaving plenty of oil on rollers, and enough on disk to keep it from rusting. When wanted again the press is made ready by wiping the rollers with a clean, dry rag, using a moist rag on the disk to "kill" the oil, then wiping dry. Water is of no benefit to roller composition. Presses should be kept covered when not in use.

In the Printing Department, where from thirty-five to fifty students come in daily for instruction, in forty-five minute periods, we do not find it impossible to keep the various rooms in a neat, clean condition. When the class bell rings every student stops his work for next class; yet we find it possible to train them to be careful about "throwing things around," and we do not find it difficult to be prepared for our next class at the end of the five minutes allowed for the shift. How much easier it is to keep in trim an office where there are from twelve to fifteen, or even fifty employes, each staying all day and feeling that they are in part responsible for the condition of the office.

Above all things, keep your dead stone clear. It is not only injurious to type to lay around and catch the dirt, but it is expensive to the office to have to "pull for sorts." Nippers used in pulling has ruined many a job font.

Mr. Fred. F. Gottschalk, an employing printer in St. Louis, at a meeting of the St. Louis Typothetae, February 10, last, read a


Reporter
19¼' x 19¼'
GENERAL
BUSINESS
ROOM.
Desk
Book Case
EDITOR'S
PRIVATE
ROOM.
9½' x 13¾'
Desk
Stock Shelves
19¼' x 19¼'
STOCK
ROOM.
Exchange Editor
Exchange Table
Files
Clothes Rack.
Cutter
Sample Case
Foreman's Desk.
Clothes & Hat Rack
News Alley
Galley
Rack
Dump
Folding Table
Cylinder Press
News Alley
Proof Press
News Stone
Drying Rack
Job Press
News Alley
Book Stone
Job Lock-up
Furniture Rack
Job Press
News Alley
Job Stone
Work Bench
Leads and Slugs
Brass Rules
Job
Cabinets
Job
Cabinets
News Alley
Job Alley
Job Alley
Job Alley
Toilet
Sink
News Alley
Cut Cabinet
Chandler. KAG.

NORTH.

paper in which he says: "Tidiness in a printing-office! An almost unheard-of proposition! . . . It is a deplorable fact, that tidiness is evidently considered a matter of such minor importance by many proprietors or foremen as to border on criminal carelessness. . . . Why is it that printing-offices are always classed as extra-hazardous risks? Surely not on account of the gallon or two of benzine or coal oil carried on the premises, nor that the material we employ is of an unusually inflammable nature. . . . It is purely and simply on account of our apparent indifference toward the underwriter's first precaution—tidiness. . . . How tidiness affects wear and tear on type and machinery is another feature of the business that proprietors are apt to think too lightly of. Starting in the composing-room, can it be even approximately estimated what proportion of the type that is dropped on the floor ever finds its way back to the case in good condition, before being stepped on, without being washed after having been picked out of the sweepings. A tidy, careful compositor will never permit any of his material to become mutilated in this fashion, but stoops then and there to pick up every letter he drops and replace it in the case. How many fonts of good, serviceable type have been made practically useless by the loss of a few single letters. . . . Dust and dirt are very formidable enemies to machinery as well as to paper stock and material handled in a printing-office."

Employing printers should always try to keep their employes interested in their business. To do this he must pay living wages. The "happy-go-lucky" fellow has no place in a well-regulated office. He is a detriment and an expense, even if he works for nothing. To earn a good salary requires the exertion of every effort, and to get a person willing to exert himself requires fair compensation. If you employ cheap help you must expect cheap work, and cheap work is expensive at any price.

J. D. RICKMAN.

President Nichols says that we have his consent for a day off to attend the maneuvers at Fort Riley, if we can all agree upon the right day. This is a great offer and we should be careful to get the best day, which we probably will, as Harald T. Neilsen has written to General Bates as to which day to come.—*Students' Herald.*

UNITY IN MATHEMATICS.

ONE of the most striking characteristics to be noted in the recent development of mathematics is the tendency toward unity and complete generalization. We have a modern pure geometry, a modern algebra, and a modern analytic geometry in distinction from the old. Speaking in a general way one may say that this newer aspect of the subject is characterized by an enlargement rather than by a refinement of the original conceptions. This fundamental idea of modern mathematics is couched under various captions, such as the principle of continuity, the principle of no exception, and the permanence of the formal laws. In this article the word unity is designed to express the same idea.

The field of geometry will perhaps afford the simplest illustration of this thought. In the words of an English writer, "by the principle of continuity is meant that a theorem should be of universal truth and application, and should be involved by no exceptions. If altered circumstances seemingly make the theorem untrue, the circumstances must give way and not the theorem—that is, suitable conventions must be introduced in interpreting the circumstances, so that the enunciation of the theorem is not invalidated. Among the conventions which are thus necessarily introduced for the establishment of this principle are the ideas involved in the algebraic symbols + and — as affecting the direction in which lines are measured, the position of areas, and the transcendental notion of imaginary points and lines."

For instance, the well-known theorem that the sum of the interior angles of a polygon of n sides equals $(n-2)$ straight angles, proved in any text-book on geometry for a convex figure, is also true for concave and cross polygons as well by the introduction of zero and negative values.

The mind of the student is directed forcibly to this conventional element of progress for the first time when the theory of exponents is presented in elementary algebra. Fractional and negative exponents open up a new field whose objects require an explanation. The interpretation of the new symbols is to be found on the basis of an assumption that a certain law of multiplication in the old field of positive integral exponents shall hold true also in the new. Since the new forms have a not unnatural origin, and since it is found convenient to make use of them, their laws and properties can be successfully investigated; but the

basis of such determination is an agreement and the emphasis should be laid upon this novel and characteristic feature in the development of the subject. This convention is assuredly in the interest of a wider view, of unification, and of progress itself along that particular line.

Much of the haziness that centers about the mathematical conception of infinity would disappear if its symbolic and conventional nature were better understood. We say that two straight lines in the plane intersect in a point and at once the one apparent exception involved in the case of parallelism occurs to the mind. The modern statement guided by this principle of universality uses the same assertive language as before and we read, parallel lines meet at infinity. The essential character of the theorem, namely, the fact of cutting, is thus preserved in form. Of course, geometrically the lines do not meet in the old sense, but a suitable interpretation is to be put upon the new statement in order to harmonize it with the universal character of the theorem. Infinity here does not denote a place but a property, even if we do for convenience clothe it in the same garb as any finite point in the plane.

These illustrations suffice to indicate some points at which the modern methods have introduced conventions in the interest of unity. We are now prepared for the more sweeping assertion that similar methods in essence have been employed from the very beginnings of mathematics and at very many steps in the advance, not merely for the sake of generality but in the interest of the progress of the science itself.

Let us start with the arithmetical notion of integral numbers and operate upon the objects of our field by the process of addition. We always obtain other objects of the field and the generalized truth is expressed by the formula $a+b=c$. In attempting the inverse operation of subtraction we are met with the impossibility of denoting the result by any of the known elements, the moment the minuend is smaller than the subtrahend. In this state of affairs there are two courses that may be pursued. We may discard the result as impossible and thus bar all progress in that direction. Or we may enlarge the original conception of addition by removing therefrom the limitation contained in the idea of increase and then adopt the unfamiliar result as a new symbol. The latter plan adds a new region, that of the negative,

to the old region, that of the positive, thus doubling the mathematical domain and the possibilities of progress.

In this connection it should be remarked that text-books on algebra, in presenting the subject to beginners, put positive and negative quantities on the same basis. Reference is made to their opposite character in such illustrations as right and left, up and down, credit and debit, etc. This is quite proper in the interest of clearness and simplicity and because it involves no inconsistencies. But philosophically speaking, negative quantities owe their existence to the adoption of the latter policy above referred to in cases of impossibility of performing subtraction in harmony with the original idea of addition. And thus mathematicians, instead of keeping on hand a large stock of exceptions in the shape of symbols denoting impossible operations, make daily use of the new characters, thereby enlarging and unifying the regions of their activities.

When we come to inquire into the origin of fractions we find their introduction necessary because of the impossibility of performing in certain cases the inverse operation of multiplication in harmony with the original definition which was based upon an acquaintance with integers only. The case stands similarly with incommensurable and imaginary quantities. In fact, the history of the rise and development of imaginary forms constitutes a most interesting chapter in mathematics. They were at first regarded as curiosities and many proposed to discard them entirely. It remained for the genius of Gauss to discover the possibilities wrapped up in them and to bring into prominence the general notion of complex number to which both real and imaginary forms have a common relation.

The tendency toward generalization is always indicative of an advanced stage of mental development. First the observation of particular phenomena, then the discovery of various controlling laws, and finally the reduction to a minimum number of fundamental principles indicate the nature of the progress toward ultimate truth. Modern mathematics, although it has certainly experienced the rapid influx of new ideas, has through close analysis concerned itself with the fundamental aspect of things, and in this effort has brought into clearer light the interrelations of its various branches. We may expect this tendency toward unification to keep pace with the similar spirit so manifest in other realms of thought.

B. L. REMICK.

BOARD PROCEEDINGS.

THE Board of Regents met on Thursday and Friday to transact the usual routine business of the fall term and to elect a number of teachers. The work of agriculture was divided into three chairs—Agriculture, Animal Husbandry, and Dairying. Prof. A. M. Ten Eyck, M. S., of Fargo, N. D., was elected professor of agriculture, at a salary of $2100; Prof. D. H. Otis, M. S., of the chair of dairy husbandry, was made professor of animal husbandry, at a salary of $1650 with house, and Asst. Prof. E. H. Webster, of dairying, was made professor of dairying, at a salary of $1350. Assistant C. L. Barnes, D. V. M., of the Veterinary Science Department, was made assistant professor.

The following selections of assistants for the ensuing year were confirmed: Theo. H. Scheffer, assistant in zoölogy, at $750 per year; Roscoe H. Shaw, assistant chemist in Experiment Station, at $1000 per year; W. F. Coover, assistant in chemistry, at $650 per year. Miss Ella Weeks was elected special artist in the various scientific departments for three months at a salary of $50 per month.

The Board considered also the matter of legislative appropriations and decided to ask for the following items next winter:

	1904	*1905*
Chapel (to seat 3000)	$40,000	.....
Horticultural Hall and Greenhouse	.....	$35,000
Library Stacks	.....	4,000
Creamery Building	15,000	.....
Addition to Shops	.....	5,000
Purchase of Land	20,000	.....
Repairs of Buildings and Grounds	5,000	5,000
Current Expenses	50,000	60,000
Farmers' Institutes	3,000	3,000
Books and Periodicals	2,500	2,500
Freight and Drayage of Coal	2,500	2,500
Water Supply	1,500	1,500
Salary State Veterinarian	2,000	2,000
Rent of President's House	330	330
Care of Funds	150	150
Salary of Loan Commissioner	300	300
Heat and Power Department	3,000	3,000
Agricultural Department	2,000	2,000
Animal Husbandry Department	10,000	10,000
Mechanical Department	2,000	2,000
Physics Department	3,000	3,000
Chemical Department	3,000	3,000
Domestic Science Department	1,000	1,000
Horticultural Department	2,000	2,000
Totals	$168,000	$147,480

THE INDUSTRIALIST.

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PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES

Supt. J. D. Rickman and family are enjoying a new Haines piano.

Doctor Mayo was called to Russell county on Friday to investigate an outbreak of rabies among cattle.

Regent Fairchild made a short address to the students after the chapel exercises on Saturday morning.

Miss Hetty Evans, of the Industrial Art Department, is rooming at the Park Place dormitories this term.

Prof. C. E. Goodell has rented rooms in Mrs. Jewell's house on Fremont, between Fifth and Sixth streets, and will occupy them for the present.

Prof. A. Dickens went to Alden, Rice county, last week to the bedside of his dying father. The professor has our sympathy in his bereavement.

Doctor and Mrs. Mayo have recently purchased the A. Huse residence, on Houston street, where they have been living since coming to Manhattan.

Doctor Mayo attended a meeting of the National and State Live Stock Sanitary Boards, in Wichita, last week. He spoke on the subject of "Stock Poisoning," at the county fair, at Newton.

The apple and sweet potato harvest on the G. Spohr farm, which was rented by the Horticultural Department last spring, began this week. The sweet potatoes are doing well, but the apple crop is light.

Doctor Mayo spent the summer vacation in Manhattan, with the exception of two weeks, when he visited in Michigan and attended the annual meeting of the American Veterinary Medical Association, in Minneapolis.

The Horticultural Department has commenced to clean up about the new addition to the library building. The stone debris makes good road material and has been used to advantage in filling and grading the road east of Physical Science Hall.

The tables for the lecture rooms of the Chemical Department have been installed in skeleton form, and at present will be provided with only the most necessary features, leaving their completion to a time when more funds are available.

We are glad to report the Park Place dormitories in a prosperous condition this fall. The spacious buildings have been thoroughly overhauled and placed in care of Mr. W. O. Gray, as the general manager, and Mrs. Harris, as the matron.

The many friends of Miss Harriet Howell, of Pasadena, will be glad to hear that in a letter to her friend, Mrs. Annie Young, she states that she is very much pleased with her position there; also that she is very pleasantly located, and likes California very much.—*Mercury.*

A. S. Hitchcock, formerly professor of botany, writes of great satisfaction in his present work. He expects to start in a short time on a two or three months' trip to Europe, where he will make a special study of the use of sand binding plants in checking the drifting of sand dunes.

The Faculty, at their meeting last Saturday, changed the last sentence of the first paragraph on page 26 of the catalogue, so as to provide for examination of all postgraduates at the end of every term. The change will affect the work of the present year as well as those of coming years.

At their regular meeting last Saturday the Hamiltons elected the following officers for the ensuing term: President, R. W. DeArmond; vice president, O. P. Drake; recording secretary, A. L. Halstead; corresponding secretary, F. L. Bates; treasurer, F. Balmer; critic, C. S. Dearborn; marshal, J. Butler.

"Klein's Cyclopedia der Mathematischen Wissenschaften," published by Teubner, in Leipzig, July, 1902, contains an extended account of Dr. A. Emch's investigations on "Linkages in Connection with Elliptic Integrals." The investigations were made and published while the doctor was a teacher at this College.

Hon. W. J. Bailey, the republican candidate for governor, and C. C. Coleman, the republican candidate for attorney-general, visited College last Wednesday morning. They attended chapel and made short and well-received addresses to the students. Both spoke on the exhaustless subjects of "good citizenship" and "practical education."

Mr. Barnes, who lives near the northwest corner of the College farm, showed us a few days ago a sheaf of bluestem grass that measured eight feet four inches in height. He judged it as tall as the bluegrass that used to grow in the sloughs between the College and the city twenty-five years ago and which was so tall on many lots that one could not see a horse grazing in it.

The Franklin Literary Society has elected the following officers for the ensuing term: President, Mr. Campbell; vice-president, B. Hoffhines; recording secretary, Ernest Greenough; corresponding secretary, Mr. Morgan; treasurer, E. C. Reed; critic, G. W. Hale; marshal, H. E. Reed. The board of directors for the ensuing term are Mr. Nicklon, Miss Hjort, and Mr. Rischell.

The Faculty, at their meeting last week, apportioned the funds for the purchase of books between the different departments. The total of the legislative appropriation for the library is $1500. Of this amount $100 was given to the Department of English, $300 to the magazine fund, and $250 to the general fund, *i. e.*, to books of a general character. Most of the books will be purchased at once.

E. Harrold and family came from Houghton, Mich., last week for a visit with relatives and friends here and at Riley. Mr. Harrold used to be foreman of the machine shops at this College. He holds a similar position in the school of mines, at Houghton, Mich., and reports that institution in a prosperous condition.

The Webster society held an election, Saturday, of officers, for the ensuing term, which resulted as follows: President, H. T. Nielsen; vice-president, A. J. Reed; recording secretary, W. O. Gray; corresponding secretary, W. L. Milner; treasurer, George Gasser; critic, D. V. Corbin; marshal, C. H. White. John Scott and C. S. Cole were elected to represent the society on the inter-society oratorical contest committee.

Last year the total enrolment one week after the beginning of the fall term was 785 students. This year the number was larger by 110—that is, 895. This does not include the members of the short course in domestic science, who begin work the present week and who will probably number from 30 to 60 young women, nor does it count the apprentices in the shops and a large number of students who had not passed their entrance examinations at that date. We will probably enroll 1000 students this fall term and reach the 1600 mark before Commencement. The enrolment in detail is: Seniors, 60; juniors, 157; sophomores, 177; freshmen, 387; preparatory, 110; special, 4.

Prof. Clark M. Brink, A. M., Ph. D, who takes charge of the English Department, comes to Manhattan from Kalamazoo, Mich., where he was professor of English and history for six years. He is a graduate of the University of Rochester, from which he received the degrees of A. B. and A. M., and of the Rochester Theological Seminary. He spent three years in graduate study in the University of the city of New York, which conferred upon him the degree of Doctor of Philosophy. For three years Doctor Brink was instructor in rhetoric and oratory at Brown University, going from there to Kalamazoo College. One year ago he resigned his professorship for a year of special advanced study. In commenting upon his resignation a Detroit paper, edited by a member of the board of trustees, said: "The resignation of Prof. Clark M. Brink, Ph. D., head of the department of English and history at Kalamazoo College for the past six years, comes as a surprise not only to the board of trustees but to his many friends in Kalamazoo and throughout the state. By this resignation Kalamazoo College loses an esteemed and valued professor. Doctor Brink, during the six years of his service at the college, has shown himself to be a master-workman; he has done much for the department of English and history." At Harvard last year Professor Brink did special work in English, pedagogy, history and economics. He has also written numerous artciles for the press, particularly on subjects connected with American history. Dr. Brink is an experienced educator who will unoubtedly establishd a high standard of work in the Department of English at this College.

The plumbing in the chemical laboratory is not yet complete. Although ordered more than two months, some of the wyes and tees necessary to make the connection in the drains have not yet arrived. Enough came to provide drainage for the preparation room on each floor, and at present the drainage from the main laboratories is collected in buckets and carried to the sink in the preparation room. Chemical students must have laboratory work even if it be under difficulties.

Owing to insufficient funds for equipment, the chemical laboratory can not be provided with all of the ventilating hoods and laboratory tables. A hood will be built in each of the laboratories and most of the tables left out of the laboratory for advanced work and some out of the others. None of the new tables are finished yet, as the Mechanical Department is still waiting for a mortising machine ordered long ago. In the meantime, the department is finding difficulty in accommodating all of the students.

Prof. C. L. Barnes, D.V. M., who has been elected assistant professor in veterinary science, to fill the vacancy due to Mr. Kinsley's resignation, arrived at the College August 25. Professor Barnes is a graduate of Cornell University, '00, where he received the degree of D. V. M. As a student he filled the position of demonstrator of anatomy for part of the year of '98 and the year '99. Since receiving his degree he has served two years as assistant veterinarian of the Washington State Agricultural College, at Pullman. He comes to us well recommended and is full of the push and energy that wins in the class-room and laboratory.

ALUMNI AND FORMER STUDENTS.

May Secrest, '92, formerly assistant in the Domestic Art Department here, is teaching domestic science at Stephens Point, Wis.

Samuel Dolby, '97, writes Professor Walters that he is stationed at Barrack 6, of the National Military Home, Ohio, and plans to leave the army for a position as civil engineer in the United States interior department.

Announcement has been received of the marriage of John J. Fryhofer, '96, to Miss Mary Loraine Divers, of Sedalia, Mo., September 17. Mr. and Mrs. Fryhofer will be at home after October 1, at 1810 Byers avenue, Joplin, Mo.

Bulletin No. 1, of the Dunn County School of Agriculture and Domestic Economy, Menomonie, Wis., is at hand. It is a circular of information outlining the courses of study for the year. This is the first county school of agriculture established in America. K. C. Davis, '91, is principal of the school and Grace Stokes, third-year in '97, is instructor in domestic economy. The school is desirous of obtaining library material, and contributions of value will be much appreciated.

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ISSUED WEEKLY BY

KANSAS STATE . . . .
AGRICULTURAL COLLEGE

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Local Editor, - - PROF. J. D. WALTERS
Alumni Editor, - PROF. J. T. WILLARD

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THE INDUSTRIALIST.

VOL. 29. MANHATTAN, KAN., OCTOBER 7, 1902. NO. 3

A WELL-RECEIVED RESPONSE.

WHEN reporting the different exercises of last Commencement the INDUSTRIALIST promised its readers to publish at some future time excerpts from the addresses given by members of the Alumni Association. We are happy to-day in being able to report the toast to "Our Housewives," by Mrs. Flora Donaldson-Reed, '81.

Introduced to the association and the guests by Toastmaster H. C. Rushmore, Mrs. Reed said:

"Had I been asked to eulogize the 'New Woman,' I should have been in despair—a subject so immense, so inexhaustable in its proportions that the eloquence of a Webster, or the volubility of a Mrs. Partington would fail to do it justice. But the 'Housewife'—we feel as if we were tenderly, pityingly, rescuing a little wren, broken winged and bleeding, from the talons of an eagle—how can we compare such insignificance, such mental frailty with the progressive woman, this modern Juno whom her Jove outwits? Behold her going forth conquering and to conquer. With the force and rapidity of a volcanic eruption she invades every field of action in which man was once found. The power of her personality shakes the earth from pole to pole, from center to circumference. Her majestic stride oversteps every obstacle, surmounts every difficulty, till she stands preëminently superior, not only to her sister housewife, but to man himself.

"While this sublime creature is wielding with undaunted courage, her power, her pen, and her hatchet; while from the stage, the lecture platform, the political arena, the club, she is making her voice felt for the uplifting of her sex, how is the housewife employing her head, her hands, and her heart? Oh, ye angels, weep while I record it! She is mending John's overalls and rocking the cradle. 'Twere as if we turned from the glorious splendor of the Aurora Borealis to the simple beauty of a forget-me-not, or from the dazzling brilliancy of the noon-day sun to the

flickering light of a candle. The housewife! The very name provokes levity; 'tis her intellectual death knell, a synonym of incapacity—nothingness. Incapable of grasping the great problems of life, which occupy the mind of her inimitable sister, she in her *bonhomie* is employing all her time and thought on nonessentials—the making of a home, the rearing of her family, the daily devotion to those self-imposed tasks which she, in her weakness, cherishes; wholly lacking in appreciation of those things which so conclusively prove the superiority of the up-to-date woman.

"Let us look for a moment into that home to which the housewife pays such loving homage. 'Tis shamefully conspicuous for the absence of the soul uplifting and ever inspiring, the dust enveloping, the husband developing, that undeniable index of culture and refinement—the bric-a-brac. And her sofa; is it heaped high with pillows, embroidered, hemstitched, cat-stiched, feather-stitched, briar-stitched, beruffled, bespangled, bedecked, innumerable, untouchable, bewildering? No! there is nothing beautiful there, nothing artistic, nothing extraordinary in any way; simply John, taking his noon-day nap. His magazine has fallen from his hand to the floor, and on his bronzed and weather-beaten face is a smile as of peace, contentment. Beside him, rhythmically rocking to and fro, softly crooning a lullaby to number five, is his wife—the housewife—satisfied, happy. The world and its allurements have no fascination for her. Enveloped in the dense fog of her environments, she sees not the possibilities of the world of achievements; she is even indifferent to the 'Mothers' Congress,' that happy combination of childless wives and spinsters of uncertain age, whose lectures on 'The Training of the Child' are the envy and admiration of the intellectual world. Could this Madonna of the frying-pan comprehend its import, apply its teachings, the rising generation would know the name of housewife only as we know the antediluvian age by its fossils. But the hope is vain. This domestic nonentity courts her isolated life which gives her leisure to grow mentally and spiritually with her family. Their love and approbation is more to her than the plaudits of the multitude. What grace and spontaneity may be observant in her conversation is due to her daily perusal of that literature which she deems necessary in the performance of her mistaken duties as wife and mother. Like the child who prefers

'Mother Goose' to 'Dante,' she may be found reading a discourse on 'Domestic Economy' or, perchance, a treatise on 'The Effect of Sunshine and Pure Air on the Bacillus of Tuberculosis,' while her exalted sister is focusing all the powers of her splendid intellect on the infinitely more important subject, 'the color problem of her club.' Alas! Madam Domestic is of such mental caliber that she will probably never arouse from her lethargy, from the sordid littleness of her surroundings. Let us then meekly accept the inevitable, acknowledge the survival of the fittest, and while our sister, the divine Minerva, soars, Pegasus like, into the very realms of the enchanted, we will just put on our sun-bonnet and run home to John, the babies and the chickens."

THE STRENUOUS LIFE; A PSYCHOLOGIC VIEW.

STRESS AND STRAIN OF EVERY-DAY EXPERIENCE.—Study people for a view of their nervousness. Go to the busiest street corner in the great city, where bells and gongs and whistles are sounding; where there go hurrying by street-cars above and below, and great truck-wagons, and all other kinds of vehicles, besides thousands of people all seemingly intoxicated with a mad desire to get somewhere. And then watch the drawn faces of the latter and see written thereon various serious expressions ranging from simple anxiety to dire despair. Watch them as they crowd out of street-cars and railway trains and rush into stores and workshops.

Again, take notice of a group of men at a hotel dining-table as they "bolt" their food from right and left with both hands, working and perspiring almost like madmen. Follow them in their conversation, noting their great respect for superlatives as they speak of the "shortest route" and the "fastest train" and the "earliest edition," and the like. As a companion study to this, go into some well-furnished home where a group of women are attending a reception, and notice that a majority of them are under a nervous strain as they sit on the forward edge of the chair rocking vigorously, and fanning hurriedly, and talking strenuously, and showing other indications of intense enjoyment. Then, wait till the guests go home and witness the probable nervous collapse of the woman who gave the reception. Add to this group also the excitable young high-school girl, who chews her gum with such a rapid movement, and also the amorous young man who, with pal-

pitating heart, by siege and by storm, is fighting his way to that coveted citadel, the heart of his lady love.

And then, too, consider the imaginary foes the people are fighting—the bugbear of failure, the premonitions of death and destruction, the continuous warfare with the traditional "devil." Surely the people are living a strenuous life!

But this is not all. In addition to this outward nervous activity so noticeable to all, there is a physical effect within the body that is even more significant. This effect comes to the surface slightly in the red glow on the face of one blushing and the pallor of one who is frightened. It is now known that every emotion has its physical concomitant in some such form as disturbed heart action, change in blood distribution, variation in nervous and muscular tension, affection of vital organs, and the like. All parts of the body are under the control of the nervous system, of which the brain is the center. Every intense idea or emotion sends a wave of impulse over this system and registers an effect in some part of the body, as in the case of blushing cited above. Why is it literally true that "worry kills?" Worry is a nervous affectation attended by deep and constant emotion which restricts the action of the blood vessels and other organs, especially in the region of the stomach and viscera, cutting off much of the warm flow of blood to these organs and thereby weakening the performance of their functions. A chilly sensation is experienced in these parts and there is also quivering in the region of the solar plexus. Indigestion, with its attendant derangements, is a natural consequence. It is thus easy to see why a chronic case of the "blues" is accompanied by dyspepsia. I trace this effect simply to show the result of one of the many forms of the "strenuous life," viz., worry. Others are just as marked in their effect. The nervous strain attending all forms of nervous excitement, such as fear, anger, anxiety for the future, and remorse on account of the past, registers a positively deleterious effect upon some of the vital parts of the physical organism.

Examine yourself and see if you do not come somewhere in the list. Is there not somewhere a nervous strain of which you have likely been unaware heretofore? But is there a remedy? Let us see.

A BRIGHTER VIEW.—He who would most successfully meet the exciting conditions of this busy world must learn the law of self-

adjustment. The one who has found his soul's center by habitual practice of equipoise is not disturbed mentally by the storms of excitement that rage without, nor is he subject to fits of melancholy. He calmly views the field of proposed action; and, seeing the adjustments necessary to the given situation, he may hurry if need be, but he does not become excited. The law of his life is "Nothing to excess." He is successful in any undertaking, because he has learned that one of the first principles of success is a wholesome, positive, optimistic state of mind accompanied by calm, deliberate judgment. One who is possessed of such a quality of mind naturally draws around himself the forces that contribute to his progress and uplifting.

There is no doubting the fact that, while many thoughts tend to excite the mind, there are others that have the opposite tendency. If one is seriously desirous of acquiring an even temperament, let him attend carefully to the character of his thoughts. A little attention to this matter will soon start one on the road to attainment. He should by sheer force of will keep out of mind all ideas that give rise to the emotions of anger, fear, hatred, anxiety, and the like, and purposely entertain such as produce emotions of joy, peace, and spiritual love. Any suggestion that has a tendency to excite the mind is met by a counter suggestion. A great minded man of olden times was thrown into prison and stoned, and buffeted about, and suffered nearly every other manner of persecution, yet, in the midst of all this, he was able to say, "None of these things move me." It is a good motto for the one of nervous temperament. When the Great Teacher saw that his disciples were worn out with worry and discouragement, how he restored their lost buoyancy of mind with the wonderful statement, "Peace I leave with you, my peace I give unto you: not as the world giveth give I unto you. Let not your heart be troubled, neither let it be afraid."

The practice of self-poise is one of the fine arts, and he who masters it is in possession of a thing of beauty which is a source of joy forever unto his soul, and it is he alone who can secure an insight into the truly spiritual life.

W. A. McKeever.

President Nichols and several of the professors are planning to attend the inauguration festivities of the new chancellor of the State University, next week.

FALL TERM (1902) PROGRAM, SHOWING INTR

INSTRUCTOR.	First Hour.	Second Hour.	Third Hour.	Fourth Hour.
Walters	Proj. Drawing ...23	Proj. Drawing ... 11	Proj. Drawing 38	Descrip. Geom....23
Evans	Drawing 33	.....	Object Drawing.. 9	Object Drawing ..14
Brown	Singing, Notation, Orchestra, etc			
Brown, R. H.	String and Band Instruments			
Harris	Piano			
Willard[3]	Ag. Chemistry....20	Anal. Chemistry..41	.....	Chemistry[2].....18
Weida	.....	Chemistry I.....51	Chemistry I.....55	Chemistry I.....60
Shaw[3]	.....	.....	.....	.....
Popenoe[3]	Entomology. 4	.....	.....	Zoölogy 22
Dean[3]	.....	.....	Entomology.....31	.....
Remick	Anal. Geometry ..34	Algebra III.....41	Algebra II 34	Algebra III 53
Anderson	Geometry I 45	Algebra II 35	Geometry I ..... .44	Trigonometry.....27
Bowen	Algebra I 36	Geometry II 23	Algebra I 34	Geometry II.....31
Eyer	Electrical Meas .. 2	Electrical Eng .. 7	.....	Physics[1] 18
Hamilton	El. Physics.....61	El. Physics.....45	Physics.....27	Physics.....35
Goodell	Economics.....29	Economics.....38	Gen. History 49	Gen. History.....51
Roberts[3]	.....	Morphology.. 2	El. Botany 40	.....
Paull[3]	El. Botany.....44	El. Botany 41	.....	El. Botany 41
McKeever	German 7	History of Ed..... 7	Composition 35	.....
Clure	Oratory I... 50	Oratory I.....33	Oratory IV..... 5	Oratory IV 14
McCormick	.....	.....	Appl. Mechanics..10	Steam Eng..... 9
Sawdon	Agricultural Mechanics, Mondays			
House	Carpentry.....44	Carpentry.... 44	Carpentry.... 44	Carpentry.....
Wabnitz	.....	.....	.....	.....
Gasser	Blacksmithing, Mondays			A.M. 19; P.M. 7
Ridenour	Foundry, Mondays, A.M			
Otis[3]	.....	.....	.....	.....
Shoesmith[3]	.....	.....	.....	.....
McIntyre	Home Nursing... 36	Hygiene at 7:50		
Agnew	.....	Cooking, first term short course		
Staatz	.....	Cooking, first term short course		
Mayo[3]	Comp. Anatomy..20	Hyg. Farm Ani...27	Physiology.....11	Physiology.....38
Barnes[3]	Bacteriology.....21	Bacteriology 12	Bacteriology 23	.....
Dickens[3]	Horticulture.....46	Horticulture. ... .33	.....	.....
Greene[3]	Forestry..... 2	.....	Pomology..... 2	.....
Clure, Mrs.	Calisthenics			
Brink	Eng. Readings 47	Rhetoric 48	Rhetoric 40	Themes 43
Rupp	Composition 30	Themes.....33	Eng. Readings II..29	Eng. Readings I...40
Rice	Composition.....30	Composition 40	Eng. Readings II..32	Composition 45
Webster	Creamery			
Rickman	Printing..... 7	Printing..... 3	Printing..... 9	.....
Jones	Sewing I.....21	Dressmaking	...17	Sewing III.....14
Cowles	Sewing IV.....15	Sewing I.....19	Sewing III.....10	Sewing I... 21
Coe	.....	Sewing II 5	Sewing I.....19	Sewing I. 23
Stump	.....	.....	Sewing I..... 20	.....
McFarland	Bookkeeping.....46	Bookkeeping.. ...41	Bookkeeping.....39	Bookkeeping.....50
Holroyd	Grammar A.....	Algebra I.....	Arithmetic B	Algebra II.....
Short	Grammar B 35	Algebra I 40	Grammar B ..... .35	Read. and Spell...20
Spilman	U. S. History B.....	U. S. History B.....	Eng. Readings I.....	.....
Vail	Algebra I.....36	Bookkeeping.....15	Algebra I 34	.....
Ross	.....	Arithmetic B 29	Arithmetic A 46	.....
Thompson	.....	U. S. History A ...10	.....	Composition 23
Noyes	.....	.....	.....	Geography.....27

[1] First half term.
[2] Second half term.
[3] Experiment Station Work.

Morning Class Hours:
(Tu. Wed. Th. Fri. Sat.)
1. From 9:05 to 9:50.
2. From 9:55 to 10:40.
3. From 10:45 to 11:30.
4. From 11:35 to 12:20.

RUCTOR, SUBJECTS, AND NUMBER IN CLASS.

Fifth Hour.	Sixth Hour.	Seventh Hour.	Eighth Hour.
Geometrical Drawing	Tu., 42; Th., 38		
Freehand Drawing	Tu., 106; Th., 95; F., 96		
Analytical Chemistry Laboratory	W. & F., 41		
Chemistry I Laboratory	40		
Zoölogy Laboratory	23		
Laboratory Assistant			
Psychology at 7:50	12		
Oratory III at 7:50	23		
Machine Design	F., 10		
Machine Drawing	Tu., 18; Th., 19		
Carpentry	Tu. & Th., 29; W. & F., 44		
Machine Shop	Tu. & Th., 13; W. & F., 28		W. & F., 11
Blacksmithing	Tu. & Th., 18; W. & F., 20		Tu. & Th., 6; W. & F., 12
Foundry	Tu. & Th., 10; W. & F., 10		Tu. & Th., 8
Domestic Science I.		Tu. & Th., 40	
Therapeutic Cookery		W. & F., 17	
Cooking, second term	18		
Hygiene, Tuesdays at 7:50	226		
Bacteriology Laboratory	Tu., 10; W., 12; Th., 13		
Horticulture Industrial	31		Tu. & Th., 35
Printing	Tu. & Th., 14		
Sewing, first term short course		22	
Sewing, first term short course		22	

Afternoon Hours:
(Tu. Wed. Th. Fri.)

5. From 1:30 to 2:30.
6. From 2:35 to 3:35.
7. From 3:50 to 4:50.
8. From 4:55 to 5:55.

CRAVING FOR FICTION.

FICTION has, since the beginning of time, occupied an important place in the world's literature; and it should be thus, since God has endowed man with a craving that will not let him rest, but which compels him to seek the very things necessary for his guidance through life. This craving is a desire to know what others are doing, and to add to his experience the experience of others. Neither does he wish to know them in the abstract but in the concrete; not so much what they are but what they are doing. And if he can not see them undergoing adventures in reality he wishes to see them in imagination; in other words, he wants to hear or read a good story.

In order to form a vague idea of this desire for fiction, over that for any other class of literature, one has but to stand by the librarian's desk in any of our large cities where free public libraries are established. It is evening, the factories and shops have closed; the men and women, boys and girls—free. See the jostling crowd passing in, each eager for a book—a novel of some sort, with which to spend the long, and to some weary, monotonous hours, till the goddess, Sleep, shall wave her magic wand and convert all into a bright fairy land.

For further proof of the predominating demand for fiction consult the library returns. During one year in an Iowa city, of five thousand nine hundred six books drawn five thousand ten were fiction. The reports from twenty-four other libraries show that sixty-eight per cent of the books taken from their shelves are works of fiction. This, certainly, is a large proportion and amounts to saying seven out of every ten books read are novels, thereby leaving but a very small margin for history, biography, and science, or what may be called useful reading.

A Sabbath-school in a certain city boasts a handsome library of between five and six thousand volumes. The librarian, when speaking of the books drawn each Sabbath, said: "Take the fictitious works from our library and the door would open on empty shelves." Surely, a strong evidence of the craving for fiction.

What is a good novel that it can thus thrust biography and history aside? Wherein lays its power to attract, to charm, to hold?

A novel treats of the common affairs of every-day life, and

deals with every-day people like the reader, who are placed in very much the same circumstances, who may be tempted, and who may be models or warnings to them—the very knowledge the novelist undertakes to give. He presents a life-like picture of this bustling work-a-day world, with its interesting scenes and incidents. There he shows a variety of characters all playing appropriate parts. We see not only the outward movement but the inner workings of their nature. We watch the motives rising in their hearts, going into action, and ending in most momentous results. We also observe how easily vice springs up, with what difficulty virtue is maintained, how selfishness always ends in degredation, and how benevolence is its own reward. Furthermore, the novel in its highest sense is as much a part of the larger life as the plays of Shakespeare, the sculptures of the Greeks, or the pictures of Michel Angelo. The novel, as the strongest and most powerful form of literature, can and does affect the national life. It can be and often is a great instructor —a school of conduct and of manners. So what if seven out of every ten persons are, at this very moment, engaged in reading novels; if it contribute to the general contentment and pleasure be it far from the purpose of this paper to protest. Let the people have all the good, pure, moral, mental relaxation they desire; it will do no harm and society will be the happier and brighter that it is so.

The good novel is a means of recreation and pleasure. When the body becomes tired out and weak from overwork, immediately a visit of two or three weeks in the country is recommended, that strange scenes, different atmosphere, a change of diet and the company of new people may restore the physical powers to their usual activity. In the same way, the mind is often harassed and weakened by its own anxious thoughts. It can not still them, and they set upon it and attack it and worry it almost to madness. Now, under these conditions a good novel is to the mind what the country trip is to the body. It is the gentle stimulus to bring the overwrought brain into a condition favorable to the rest that is found in sleep.

Then, too, we must remember there are in this beautiful world many persons whose lives are not very bright, nor whose horizon very extended, to whom the reading of a bright piece of fiction, without the taxing of their energies, is like a drink of cool water

to the fever parched lips. It takes the tangle out of their brains, lightens their load of care, rests them, and puts a little play of fancy into lives that are pretty well crowded with hard facts.

We find the same principle holding true in the reading of novels that is found in other phases of life—we get what we seek; if we search for truths and moral teachings, we find them; if on the other hand we are probing for discrepancies in our study of history or biography, we find them; therefore no harm can be engendered by a reasonable indulgence in the delights of good fiction and romances, if we carry into our reading the right spirit.

The wee child craves his fairy story, then, a year or two, and he must have his Robinson Crusoe and Arabian Knights, and we should, indeed, be sorry to lose the imaginative element in our childern. It is only by ideals that the race advances, and it is our poets and novelists who furnish us with the highest and best types of manhood and womanhood. The boy raised exclusively on "sermons and abstract mathematics" may become a model young man; but who would not rather have for his own the child whose cultivated imagination surveys the wide field outside of pure realism; who has learned to think with Shakespeare, to feel with Dante, to aspire with Tennyson to a loftier and nobler life, and to imbibe from Scott and Dickens and George Elliott those ideas of chivalry and generosity, purity and tenderness, justice and tolerance, that made the nineteenth century the brightest period in history.

Do we not, if from no other reason, find fiction a valuable aid in widening the sphere of our sympathies by taking us into scenes and enlisting our interests in characters not of the every,day life, yet not beyond the pales of common life. When these are drawn by a master hand, we rise from a good novel with our affections touched, our powers of observation quickened, our minds awakened to the possibilities of purpose or conduct in ourselves which sets us thinking as to what our lives have been or may become. Who is there who has closed the lids of a strong novel without feeling that he had been living among men and women with whom he would be delighted to mingle, and from whom he might have learned something that would have influenced his actual life.

The novel is a power, and it is to this power that many hundreds owe their first inspiration for literature of any sort. Having, in this way, acquired a taste for reading, it is reasonable to

suppose they will not be content to dwell forever in the realm of romance, but eventually will be led therefrom into studies that will require continuous and laborious investigation either in science or poetry, natural history or biography. Therefore I should like our boys and girls of K. S. A. C. to mix with their lighter literature some books of science in which the marvels of earth and sea and sky may be brought home to them; some with biographies of great and good men like Franklin and Lincoln. Fiction can present nothing more absorbing than the lives of these two great statesmen. Each of them, when a boy, had to surmount the most formidable of objects, poverty and ignorance before entering upon that career upon which each was destined to throw immortal luster. Some, with history, in which they may see why nations have risen to greatness, why they have degenerated into decay, and learn how difficult the problems with which these who are entrusted with a nation's welfare must grapple; some with natural history, that will make every object that lies around them in field and river, in woodland and mountain, teem with interest; and some in books of travel, in which without stirring from their cosy firesides they may explore every region under the sun.

To-day, the very early dawn of the twentieth century, the world is full of books to develop and cultivate tastes like these, and surely if boys and girls, men and women, could form the faintest idea of the enjoyment and elevation of the interests of life that would come to them from perusing such studies as these the craving for fiction would, in part at least, be supplemented by a craving for those books that would make of them greater and nobler beings.

ALICE RUPP.

J. D. Rickman, superintendent of printing at the College, has an excellent article in the INDUSTRIALIST of September 30. It is a discussion of the modern country printing-office, with plans presented for an office for a town of from three to five thousand inhabitants.—*Manhattan Republic.*

The following professors are taking their turn this term at conducting chapel exercises: Brink, Calvin, Clure, Eyer, Goodell, McFarland, McKeever, Mayo, Nichols, Otis, Remick, Walters, Webster, and Weida.

THE INDUSTRIALIST.

Published weekly during the College year by the Printing Department of the

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Manhattan, Kansas.

PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

Professor Goodell is moving into his new quarters in the library addition to-day.

The work of building the stalls in the new dairy stable was started last Monday, and in another week the new cattle sheds and pens will be well under way.

Prof. W. Williston writes to Professor Walters that he has commenced his work in the Chicago University and likes it very much, but that he is not charmed by the climate of the Great Lake city, so far.

The Horticultural Department is making an effort to cut through the jungle of trumpet vines, honeysuckles and ampelopsis that has grown up during the summer around the porch of the old farm house. The growth is so dense that the whole building is completely veiled, from the foundation to the gables.

President Nichols and wife, and Professor Willard, left for Atlanta, Ga., last Saturday, to attend the meetings of the American Agricultural Colleges and Experiment Stations. The party will be absent about ten days. The executive chair will be held down during the absence of the President by Professor Walters.

The Regents, at their September meeting, appropriated $100 to repair the old farm house, back of the engineering shops. Prof. D. H. Otis will move into it as soon as it can be put in good shape, so as to be near the barn and the stables. The building has been empty since last June, when Professor Cottrell moved away.

Mrs. Ada Kendrick, of Williamsburg, editor of the *Star*, called at College one day last week and expressed herself greatly surprised at the many evidences of prosperity "on the hill." She was more surprised, however, to find that the INDUSTRIALIST and much other printed matter that she had received from us was being printed with such antiquated equipment.

Editor Jones, of the Beloit *Call*, who has the reputation of possessing one of the best equipped and most modern printing-offices in the State, visited College last Friday, accompanied by his wife. He looked over our printing establishment and asked why the College was trying to teach printing and do work without proper means. He had expected to find an up-to-date print-shop, with modern machinery and linotypes. We told him that we were getting used to making good "brick without straw."

Regent Fairchild, of Ellsworth, was accompanied on his visit to the College at the last Board meeting by his wife and youngest son. They were the guests of President and Mrs. E. R. Nichols.

Prof. B. S. McFarland attended the funeral of Wm. Julien, of Olathe, Kan., and made an address on behalf of the Masons. Mr. Julien was one of the best known members of the Masonic order in Kansas.

Prof. H. F. Roberts was absent last week attending a meeting of the International Association of Plant Breeders, held in New York City. The professor read a paper on "Cereal Breeding" at one of the sessions.

H. M. Bainer, '00, of Pomona, Kan., is here taking special work in the creamery, preparatory to going to Trenton, Mo., to take a position with Prof. H. M. Cottrell on the Vrooman farm as dairyman. He will have charge of the dairy herd and the manufacture and sale of the dairy products.

The Kansas W. C. T. U. held their annual meeting at Manhattan on Wednesday, Thursday and Friday of last week, and the College received its usual share of visitors. Many of the students attended the evening exercises of the Union and President Nichols took part in the program of the first session on Wednesday.

Professor Dickens has nearly completed his new residence, north of the city park. The building is really an addition to his old home, but it overlaps the old parts to such an extent and is so neat and modern in looks and arrangement that it makes practically a new house throughout. In the spring the professor intends to plant a good part of his two-acre lot in ornamental trees and shrubs and make it one of the finest suburban homes of the city. The building will be heated by a hot-air furnace.

As has been stated in last week's INDUSTRIALIST, the Board of Regents of the College has elected Prof. A. M. Ten Eyck, formerly assistant agriculturist at the agricultural college of North Dakota, professor of agriculture. Professor Ten Eyck graduated with honors from the Wisconsin State University in 1892, took special work under Professors Henry and King in soil physics, and has made a specialty of wheat and corn production. The professor has degrees from two agricultural colleges. Aside from his theoretical knowledge, he is a practical farmer, having spent his boyhood on his father's farm in Wisconsin, afterward engaging in farming in Colorado. In North Dakota a great deal of his time has been devoted to work in breeding and testing grains and grasses, and in cultivation of soil for crop production and rotation of crops. The bulletins which he has prepared have attracted most favorable attention from the agricultural world. As a writer for agricultural papers and a worker in farmers' institutes he has been very successful. Director True, of the United States agricultural department, recommends Mr. Ten Eyck unreservedly and regards him as one of the strong men engaged in agricultural teaching.

On Friday evening, September 26, President and Mrs. Nichols entertained the members of the Board and the Faculty at their residence, corner of Poyntz and Juliette avenues. The occasion was a most enjoyable one because, perhaps, of the entire absence of a so-called program. Everybody chatted and had a good time. Light refreshments were served by the hosts.

The following table shows the comparative enrolment of students on the first Tuesday of the fall term, for the last five years:

	1898	1899	1900	1901	1902
Seniors,	55	57	60	52	55
Juniors,	70	81	76	90	157
Sophomores,	141	144	157	200	177
Freshmen,	179	214	297	312	387
Preparatory,	58	98	146	126	110
Totals,	503	594	736	780	886

In all of these statements only regular students of the four-year courses have been counted, because the short-course students, the apprentices and the postgraduates are usually not enrolled during the first week of the term. It will be seen that the attendance of regular students for the present school year is over a hundred above that of last year and nearly four hundred greater than four years ago.

ALUMNI AND FORMER STUDENTS.

Carl Rice ['97], formerly of Manhattan, in a letter to his brother, A. D. Rice, dated July 31, states that he is now employed by the government at Canayan, northern Luzon, P. I., has good health, and is studying Spanish.—*Nationalist.*

A pretty wedding occurred at the home of the bride Wednesday evening, October 1, at 8:30, when Miss Bertha J. Spohr ['98], and William R. Smith were united in marriage by Rev. Dr. John Hood. About thirty guests witnessed the ceremony, which was followed by a three-course luncheon. Just before the ceremony Miss Edith Huntress sang "O Promise Me," accompanied by Miss Rena Helder at the organ. The bride looked very sweet in her dress of sheer white. The house was beautifully decorated with palms, ferns, potted plants, and cut flowers. The presents were many and beautiful. Among these were hand-painted china, cut glass, silver and gold, and a full set of elegant table linen sent from Germany by the bride's father. The bride is a young lady of many virtues, who has endeared herself to her many friends by her noble traits of character and unselfish devotion. Mr. Smith was until recently editor and proprietor of the *Republic* here, and will continue newspaper work in Lawrence. He is a young man of much ability and energy and has made a success in his chosen field. Mr. and Mrs. Smith left this morning for Lawrence, where they expect to go to housekeeping at once. The best wishes of a host of sincere friends go with them.—*Nationalist.*

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THE INDUSTRIALIST

ISSUED WEEKLY BY

KANSAS STATE . . . .
AGRICULTURAL COLLEGE

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Editor-in-Chief, - PRES. E. R. NICHOLS
Local Editor, - - PROF. J. D. WALTERS
Alumni Editor, - PROF. J. T. WILLARD

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Charles Hughes ..... Secretary to the President
William R. Lewis ..... Janitor

THE INDUSTRIALIST.

VOL. 29. MANHATTAN, KAN., OCTOBER 14, 1902. No. 4

STEEL WORKING.

BLACKSMITHING as an art may be considered a thing of the past, yet to-day the working of steel is one of the most important of the world's industries.

Cast steel, for convenience, may be divided roughly into three kinds, according to the process used in manufacturing it, viz., Bessemer, open hearth, and crucible. In point of cost, Bessemer is the cheapest; crucible is the most expensive. With regard to quality, Bessemer, generally speaking, is inferior to open hearth, while open hearth is inferior to crucible. Just why crucible steel is superior to open hearth and Bessemer would take too much time and space to explain here, and whatever the reason the fact remains that crucible steel is the best steel. Each of the products of these three processes has its principal uses, as: Bessemer, steel rails, structural work and forge or machinery steel; open hearth, first-class boiler plate, gun parts, cheap springs and tools; while crucible is used for all first-class tools. For all intermediate purposes, there is a race for preference among them.

To work steel intelligently and successfully, the steel worker should understand something of the composition of steel and its behavior as the results of certain methods of treatment in working. To do this, it is necessary not only to know the grade of steel, but also, approximately at least, its carbon content; for grade and carbon content determine for what purpose the steel is suitable. Steel makers speak of steel as containing so many points carbon or other element, .01 of 1 per cent being one point. The carbon content of machinery steel, steel rails, structural steel, etc., is generally so low that it will not harden when quenched at an orange heat. Steel, to harden satisfactorily for tools, should contain at least 40 points carbon. Tool steel is classified according to carbon content, as low, medium or high carbon. Low carbon steel contains from 40 to 80 points carbon; medium, 80 to 115 points; high carbon 115 to 150. High or low carbon steel may be

made by the Bessemer, open hearth or crucible processes, but crucible is the best for all ordinary purposes for which steel is used, but as it is vastly more expensive than Bessemer or open hearth it is folly to use it when they will answer the purpose; and while Bessemer and open hearth will do for machinery steel, steel rails and cheap tools, they are unfit for making good tools. The principal elements combined with iron to form steel, and their proportions in a good tool steel, are, as given by Metcalf in his treatise on steel: Carbon, 60 to 150 points; manganese, 10 points; silicon, 2 points; phosphorus, 1 point; sulphur, .5 point. Carbon is the great hardener in steel, and while there is some difference in opinion as to the benefit of silicon and manganese in steel, sulphur and phosphorus are always injurious to steel and most good authorities are agreed that the nearer steel is to pure iron and carbon the better the grade of steel.

Crucible steel is made in different grades, and while carbon content has nothing to do with cost, the grade has everything to do with the cost of steel. In making a low grade of steel by the crucible process, cheaper materials are used than in making high grade steel. There are numerous methods in practice by steel workers to enable them to distinguish between good and poor steel. One way is by breaking off a piece and noting the fracture. Low-grade steel has a dark, uneven fracture, and looks dead; high-grade steel has a fracture much lighter in color, is what is called sappy, with a bluish-gray color, some lustre, and a silky appearance as compared with the dull, dry, and sandy-looking fracture of low-grade steel. The fracture is also an index to carbon content, steel of high-carbon breaking off shorter and smoother than steel of low-carbon content. A great help in determining whether a piece of steel is high or low carbon is the way in which it forges, high-carbon steel being harder to forge, as it is less plastic than low-carbon, and, when the piece is forged thin, the high-carbon steel cools more quickly under the hammer. In addition to this, the scales from high-carbon steel when heated to orange color and forged are much finer and silkier than from low-carbon steel.

In speaking of colors to which steel is heated, it is best to designate them as different shades of orange and lemon, rather than shades of red, for steel in heating passes through shades of orange rather than shades of red.

REFINING STEEL.—In heating a piece of steel every variation in heat results in a variation in grain, the high-carbon steel being more sensitive to heat than low-carbon steel. It sometimes occurs that the grain of two bars of steel bought for the same grade and carbon content is entirely different, one bar being fine and the other coarse-grained. A novice would say that one was good and the other poor steel, but both bars are equally good, the difference in grain being due to the difference in heating. If both bars are heated to the same heat they will both have the same grain. The heat at which a piece of steel takes the finest grain is called the refining heat. As every variation in carbon content changes the grain of steel at the same heat, it is plain that the refining heat of steel varies with the carbon content. Hence, while it is not necessary to know just what percentage of carbon a piece of steel contains in order to heat it to the refining heat, it is necessary to know whether it is high, low, or medium carbon content. The higher the carbon content, the lower the refining heat. For low-carbon steel the refining heat is light orange; for medium carbon, medium orange; for high carbon, dark orange. To show the effect of heat on the grain of steel take a bar of steel as it comes from the rolls, mark off seven pieces, each about one and one-half inches in length, numbering them consecutively from one to seven, and notch at marks to facilitate breaking off the pieces after they are hardened. Heat No. 1 to dark orange, harden by quenching in cold water and break off at first notch. Repeat this heating and hardening, breaking off the end piece after each operation, observing the following: Heat No. 2 to medium orange, No. 3 to bright orange, No. 4 to dark lemon, No. 5 to medium lemon, No. 6 to light lemon, and No. 7 to cream color. On comparing the grain of these seven pieces, no two will be found alike. If the bar is low carbon, No. 3 or bright orange will have the finest grain. If medium carbon, No. 2; and if No. 1 has the finest grain, the bar is high carbon. In all the pieces heated above the refining heat the grain will be coarser, the highest heat having produced the coarsest grain. Now mark off two more pieces, Nos. 8 and 9, and heat both pieces to a lemon color, harden both and break off No. 8. Now heat No. 9 carefully to the heat which gave the finest grain, giving plenty of time for the particles of steel to readjust themselves; harden and break off the same as the other pieces, when No. 9 will be found to have the same grain

as the piece that was heated to the refining heat the first time. As long as a piece of steel has only been overheated, it can be restored by simply heating carefully to the refining heat. Working the steel will also help to restore the grain. After a piece of steel is actually burned it is worthless and fit only for scrap.

FORGING.—To forge steel, have a clean fire, with plenty of well-coked coal. Cumberland, Blossburg, or Piedmont, are all good forge coals. In heating steel for forging, heat slowly, carefully, and uniformly, taking care not to heat higher than necessary for the amount of work to be done. If the piece of steel is not of uniform size, place it in the fire so that the lighter parts will not be overheated by the time the heavier portions come to the proper heat. The heat to which a piece of steel may be safely heated depends on carbon content and the amount of work to be done on the steel. When a great deal of forging is to be done on a piece of steel, it not only can but should be heated slightly above the refining heat, drawn out by heavy blows, evenly distributed, doing as much work as possible at one heat. The forging will close the grain opened by the high heat, while the high heat makes the steel more plastic, allowing the center as well as the outside of the bar to be worked. If the stock is to be greatly reduced in size and is heated only to a low heat, it is not plastic enough to be worked throughout its thickness by the forging, and the hammer blows draw out the outside of the stock much faster than the inside, which sets up strains in the steel, and in hardening and tempering these strains may produce cracks or at least warp the steel. When but a small amount of work is to be done on a piece of steel, as when it is forged almost to the required size, heat only to the refining heat. All thin-edge tools, such as chisels, knives, etc., should be thoroughly packed. Packing makes steel more dense, thus increasing its strength and tenacity. To pack a flat edge tool, have the tool a trifle thicker and narrower than it is to be when finished. Heat carefully to a very dull red—orange heat is too hot—then pack with heavy blows evenly distributed on both sides. Stop striking as soon as the steel is no longer red; to continue would only crush the grain of the steel. After beginning to pack the steel, never strike on the edge of the tool, as that would destroy all the packing effect of the blows on flat side of the steel.

The idea that upsetting cast steel injures it for subsequent use for edged tools is a mistake. Cast steel is crystalline in structure

and not fibrous like iron or puddled steel, and a piece of steel may be cut off a bar, set on end, upset and drawn out crosswise with the bar, and makes as good an edge tool for any purpose as though it had been drawn out lengthwise with the bar. However, it is not advisable to upset the edge of thin cutting tools simply because, even with the greatest care, the edge is likely to double and in subsequent working, especially in hardening and tempering, to develop cracks as a result of such doubling. Furthermore, the frequent heating necessary for upsetting a thin edge is not beneficial to steel.

A piece of steel should never be left to "soak" in the fire after it is heated through, but it should be taken out as soon as heated to the necessary heat and all the work possible done on it at one heat. Soaking cast steel destroys the crystalline structure of steel causing it to resemble soft cast iron more than steel, making it worthless for tools.

WELDING.—Cast steel of low and medium carbon content can be welded satisfactorily, but a weld in very high carbon steel is not reliable. In welding tool steel a flux is used. There are many welding compounds on the market. Cherry Heat Welding Compound is one of the best, but borax mixed with iron or soft steel filings is equal or superior to any of them.

ANNEALING.—A piece of steel as it comes from the factory, or after it has been forged in the smith shop, is too hard to file, drill, or be machined readily. It becomes necessary to resort to annealing, or softening of the steel. Annealing is accomplished by heating the steel to be annealed to the refining heat, and allowing it to cool slowly. The slower the rate of cooling, the softer the steel will be. One method is to heat carefully to refining heat, then place in either wood ashes or air-slacked lime, or a mixture of the two in equal parts, allowing it to remain covered until cold. Water annealing is accomplished by heating the steel to the refining heat, allowing it to cool, and, just as it reaches the point where when held in a dark place it no longer shows red, plunging it into the water. It does not make the steel as soft as the first method, or as soft as when the steel is allowed to cool gradually from the refining heat, in a warm, dry place until it is entirely cold. Its chief recommendation is its rapidity. A light, flat piece of steel that cannot be annealed soft enough to be worked by any of these methods may be annealed by heating to

the refining heat and clamping between two pieces of soft pine, leaving there until cold.

HARDENING AND TEMPERING.—Hardening and tempering steel ordinarily comprise two distinct operations. Hardening consists of quenching suddenly a piece of heated steel in water or some other cooling medium. Hardening should always take place from the refining heat, for steel hardened from this heat has the maximum strength possible to obtain at that hardness. A piece of steel, unless it be high carbon, hardened from the refining heat, although it will rarely scratch glass, is still too hard to cut with a file. In exceptional cases it is necessary to sacrifice strength for hardness, but such cases are rare.

Tempering is a softening of hardened steel to the degree of hardness requisite for the work the tool is to do. The proper temper is determined by means of colors. When a piece of hardened steel is brightened and heat applied, it gradually changes color. These temper colors as they come out are pale straw, dark straw, brown, purple, dark blue, pale blue. The first color, pale straw, indicates the greatest degree of hardness, also the least degree of heat, 430° F. Blue indicates the least degree of hardness and represents the greatest degree of heat, 630° F., of the colors named. These colors can be brought out on any piece of brightened steel or iron, and while they always indicate certain degrees of heat, they only stand for degrees of hardness on a hardened piece of steel. A piece of hardened steel resembles glass in its hardness and brittleness, while after the hardened steel is tempered it is more like whalebone. Enough back heat, as it is called, may be left in the body of the tool when it is hardened to draw the temper, as in hardening and tempering a blacksmith chisel; or the tool may be entirely cooled and drawn to the proper temper over a clean fire, a hot iron, or by the use of a brazier or gasoline torch, as is done in tempering a tap or reamer. And again, it may be found advantageous to combine both methods of drawing the temper, as in hardening a hand cold-chisel.

Edge tools of steel for all purposes require hardening only, or hardening and tempering before they are ready for use. Hardening and tempering, including the heating of steel, are the most important and delicate of all the manipulations of steel. They are the most difficult, requiring the greatest skill and experience to perform them successfully. The idea that all that is necessary

in order to temper a piece of steel is to place it in the fire and rush quickly to some shade of red, plunge into a hardening bath (made according to some receipt, which is supposed to remedy all defects in the steel), then draw to a certain temper color, regardless of the carbon content of the steel, is very common. If the tool fails to stand the steel is condemned, when as a matter of fact it is the carelessness and ignorance of the operator that is at fault. In the hardening and tempering of steel the use of a little brains and common-sense give better results than any pet nostrum.

While great care should be exercised in heating steel uniformly and not too rapidly for forging or annealing, there is an opportunity to rectify a mistake by a careful reheating to the refining heat; but in hardening and tempering there is, as a rule, no such opportunity. It is the final heat, and on its correctness depends the success of the hardening and tempering operation. A tool properly heated for hardening should be of as uniform a color as though it had been dipped in paint of the proper color. A piece of steel may be overheated and yet not break or check in hardening, but it will not stand when used. If the tool be under heated, it will simply be too soft. Of the two evils the latter is the least objectionable, as the operator will generally discover the fault and has an opportunity to remedy it. If a piece of steel is heated unevenly, internal strains are set up in the steel; the greater the inequalities of the heat the higher the heat, and the higher the carbon content the greater the strains; but if allowed to cool slowly no fractures will result. Should a piece of steel so heated be quenched suddenly, such violent strains are set up that almost invariably the steel is ruptured in one or more places and warped as well. Quenching heated steel subjects it to great strains at best, and when the heat is uneven, or too rapid, or the heating prolonged, failure is to be expected.

To heat a piece of steel for hardening and tempering, have a good, clean fire of well-coked coal. Place the tool in the fire, so that the lighter portions will not be overheated by the time the heavier parts are to the refining heat, which for high carbon is dark orange; medium carbon, medium orange; and low carbon, light orange. When the tool has reached the refining heat, take out immediately, and dip into the water or cooling medium employed, moving to and fro to cool evenly and rapidly, and if only part of the tool is to be hardened, giving at the same time a slight

up and down motion to prevent the formation of a sharp dividing line between the hard and soft portions of the tool. Keep the tool in the water until the part to be hardened is so cold that when taken out of the water it remains wet. Clean or brighten by means of an emery stick or piece of sandstone, to enable the operator to see the temper colors, and draw to proper temper color by one of the methods given. When the proper temper color is obtained, dip into the water, allowing it to remain there until cold. The slower the temper is drawn the tougher the tool will be. If the temper can be drawn so slowly as to make it unnecessary to cool the tool, so much the better.

One of the best methods for getting a uniform heat on such tools as taps, dies, drills, reamers, milling cutters, etc., is the lead bath. By bringing the lead bath to the proper heat, and stirring the bath to keep it of uniform heat, there is very little danger of getting the steel too hot. There is also less danger of warping such tools as taps, reamers and drills, because they are heated uniformly. The bath should never be allowed to get above the refining heat for the steel that is being heated. If in heating a tool for tempering it should accidentally get above the refining heat, lay it aside and allow it to become cold before heating again. This is necessary because the highest degree of heat reached in the last heating determines the grain of the steel and not the heat at which the steel is quenched. The heat at which the steel is quenched determines the hardness. After two or three unsuccessful attempts at hardening and tempering a tool it is best to forge the tool, or if that is not possible, to anneal before trying to temper it again. The forging or annealing gives an opportunity for the strains in the steel, caused by the attempts at hardening and tempering, to become adjusted or equalized.

When a piece of steel has been annealed there is always a decarbonized skin formed on its surface. The skin may not be entirely decarbonized, the extent and depth of the decarbonization depending on the heat to which the steel in annealing is subjected and the duration of the heating. As it takes longer to heat a large than a small piece, the larger the piece of steel the deeper, as a rule, this decarbonized skin, which varies in depth from one sixty-fourth inch on small pieces to one-eighth inch or even more on large pieces. If only partly decarbonized, while it will still harden, yet it will require a higher heat to harden this skin than

the body of the steel, and as a result the partially decarbonized skin is either not hardened or the body of the steel is overheated. To harden a piece of annealed steel accurately, this skin must be removed; it is economy to do so.

In tempering the operator must also take into consideration the light. The light should be subdued, not a bright glare, and the nearer uniform the light is during the time of working the better. Moreover, no sensible person will expect to temper successfully while welding or working with iron or steel at high heat, or immediately afterward. The reason is self-evident.

In regard to tempering baths, clean soft water is one of the very best for all ordinary purposes. Strong brine will make a tool harder than pure water. Mercury will make a tool harder than brine, but it is too expensive for general use. For tools and articles requiring toughness more than hardness, oil is good. For springs, linseed and fish oil are good. Lard oil is not so good for springs as linseed and fish oil, but it gives greater hardness than either of them and is quite good for thin-edge tools. Any tempering bath should be of sufficient quantity so that it is not heated perceptibly by the tool quenched in it. Too small a quantity of the hardening bath tends to produce uneven cooling. In hardening any tool it should be held perpendicularly when plunged into the bath, as it is less apt to warp than if plunged at an angle. Uneven, or too rapid, or too high heating, or uneven cooling after heating, one alone or all combined, have a tendency to check and warp steel. There are various theories as to just what takes place within a piece of steel when it is hardened, some theories appearing more reasonable than others. But however learnedly and unintelligibly chemists may talk of molecular rearrangement and crystalline transformation, and however widely their theories in their attempts to determine and explain these changes differ, they are all agreed that the sudden quenching for hardening of heated steel produces violent strains which cannot be avoided, and both theorist and practical worker are agreed that for the operation to be a success these strains must be reduced to the minimum and as nearly as possible equalized.

How to Make a Cold-Chisel.—The first requisite in making any tool of steel is to have steel suitable for the tool. Some tools should be made of high, some of low carbon. For some purposes a better grade of steel is required than for others. A cold-chisel

requires good steel; whether high or low carbon depends upon the operator. There is good steel made in this country as well as elsewhere. The three principal crucible cast steel makers in America, The Cresent Steel Company, Pittsburgh, Pa., Sanderson Brothers Steel Company, Syracuse, N. Y., and Park Brothers Steel Company, St. Louis, Mo., have all combined and now form the Crucible Steel Company of America, Pittsburgh, Pa., with supply houses in various parts of the country, one Western branch being located at St. Louis, Mo., 924 and 926 North Second street. Each member of the company still makes its own brands of steel, each one making four grades. The Sanderson Brothers also make a self-hardening steel. The Crescent steel, for example, is made in four grades: Crescent grade, the cheapest and poorest in quality; Crescent Extra, next in grade and costing more; Crescent Special, better and more expensive than either of the grades named; Crescent Double Special, the very finest grade and also the most expensive. The Crescent people stamp each bar with a letter corresponding with a certain carbon content. This is a great convenience to the steel worker, as by noting what letter is on the bar he can tell whether the tool steel is low, medium, or high carbon. The company supplies purchasers with a memorandum stating the uses of the different carbon contents as indicated by the letters stamped on each bar. In buying steel always state for what purpose the steel is to be used, and the steel maker can fill the order more satisfactorily, for he knows to what purpose the different carbon contents are adapted.

A great many people think no American steel is equal to the Jessop steel, while as a matter of fact the better grades of steel made by the Crucible Steel Company of America are as good, if not better. Jessop steel is all made of practically the same carbon content. This makes it easier to work, but does not give as good results as when the carbon content is varied to adapt the steel for different kinds of tools. Steel for lathe and planer tools should be of higher carbon than steel for woodworking tools, drills, or chisels, while steel for hammers and most blacksmith tools should be of lower carbon than for chisels. By getting steel of proper carbon content, Crescent Special Steel will make a tool for any purpose equal to one made of Jessop steel, and for some purposes giving much better satisfaction, when given a fair trial by any fair-minded person. For steel where one bar must answer many

purposes, Crescent Special E will do anything that Jessop will do. It is unreasonable to condemn American steel because Crescent grade and Black Diamond made for special purposes, where other steel is too expensive, is not as good as the best imported steel.

For a chisel of three-fourths inch octagon, take seven and one-half inches, draw out three inches of one end at a concave taper so that the part drawn out will be about one inch by three sixteenths inch at end, and one inch from end fifteen sixteenths inch by one-fourth inch. The cutting edge should always be wider than any other part of the blade and from the body of the chisel to the cutting edge of the blade the edges should have a gradual taper. The cutting edge should be ground at an angle of about 60°. A chisel should always be packed. To do this, have the chisel a trifle thicker and also narrower than the finished size; heat to a very dark red and pack by delivering about a dozen heavy blows evenly distributed on both sides, but never strike on the edge during the process of packing or afterwards, as that would undo what the packing has accomplished. If the chisel edges are uneven, file or grind to shape.

To temper, place in a clean fire and heat about one and one-half inches slowly and carefully to the refining heat. It is best not to have the fire any hotter than the refining heat. When hot, take the chisel out and dip perpendicularly into the water for about one and one-half inches, moving up and down and to and fro, for reasons given. When the part dipped is cold, take out, brighten (the upper part of the blade should still show red), and draw the temper to a dark brown for at least one inch in length. The back heat in the chisel will not do this, and it is necessary to apply heat externally, either by holding the hardened end of the blade over the fire or by holding over a piece of iron, say one inch by three-eights inch, that has previously been heated to orange color. Do not draw the color too rapidly, for it is easier to control the temper colors when heat is applied slowly. If the chisel is not moved about in the water when it is dipped it is apt to check at the water line and it is more difficult to get an even temper. If a chisel is desired for very heavy work, leave the blade thicker, drawing to same color, dark brown. If for light work and soft material, make blade thinner and draw the temper to a purple or even a blue color. If the chisel is high carbon, the temper color should be drawn a trifle softer than when made of steel of low or medium carbon content. E. C. GASSER.

THE INDUSTRIALIST.

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PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

The carpenter-shop is expecting the arrival of a new power mortising machine.

Prof. C. E. Goodell's family arrived last week from an extended visit at Indianapolis, Ind.

Miss Olivia Staatz, of Enterprise, has arrived and commenced her work as assistant in domestic science.

Prof. A. M. Ten Eyck writes that he will be ready to begin his duties as professor of agriculture December 15.

Prof. C. M. Brink will lecture to-night at Commercial Club Hall for the benefit of the Manhattan Library Association.

Prof. D. E. Lantz left last week for Colorado Springs to attend the National Irrigation Congress, which met there October 6 to 9.

Prof. W. H. Olin, assistant on agronomy to Professor Holden, at the Iowa Agricultural College, writes that he is highly pleased with his work.

The Farm Department has engaged C. R. Ingraham to cut its Kafir-corn with a corn binder. The work will probably begin the middle of next week.

Geo. B. McKeever, second year '91, located at Lawton, Okla., sends to Professor McKeever some fine specimens of scorpions and centipedes for the College museum.

The football game between the Agricultural College and Kansas University, at Lawrence, Tuesday afternoon last, resulted in a score of sixteen to nothing in favor of the university.

The demand for blackleg vaccine is constantly increasing. The Veterinary Department is filling large orders every day from all parts of the State. The vaccine is being distributed at one cent per dose.

Assistant L. F. Paull, of the Botanical Department, expects his "other half" here this week, from Massachusetts. They will take rooms with Mrs. R. Paulsen, directly south of the library building.

The carpenter-shop is making two lecture tables for the Physics Department. The tables are of white oak, paneled on three sides, and measure three by fifteen feet. Each contains six drawers and two small closets.

A. H. Leidigh, '02, writes from Hill Top, Colo., that he is working for the Bryant Bros., proprietors of the Broadmore dairy, Colorado Springs, Colo. H. R. Blair, short-course student last year, is also working with the firm.

H. B. Holroyd, '03, who worked for the forestry division of the United States department of agriculture this summer and fall, has returned from California to resume his work as a member of the senior class. He reports a very profitable vacation.

The football game at Manhattan Athletic Park, on Saturday, between the Haskell Indians and the College eleven resulted in a defeat for our boys. The score stood 23 to 0. The Indian played a remarkably clean and strategic game from beginning to end.

Cards are out announcing the marriage on October 7, at Milwaukee, Wis., of Miss May Gertrude Williams, the former teacher of calisthenics at this College. Mr. and Mrs. C. B. Lundgreen will be "at home" after November 15 at 103 Woodlawn avenue, North Burlington, Iowa.

Albert F. Woods, pathologist and physiologist of the bureau of plant industry, U. S. department of agriculture, spent a part of last Wednesday looking over the work of the Experiment Station. It was his first visit to the College and he expressed surprise and gratification at the work being done here.

Dr. D. F. Fox will deliver the first lecture of the College lecture course next Tuesday night, October 21, in the College chapel; subject, "Characters We Have All Met." Doctor Fox is a well-known veteran in the lecture field who will undoubtedly give us a fine literary treat. The course will comprise eight lectures at the low price of $2, $1.75, or $1.50. No student can afford to stay away. The drawing of numbers for seats took place yesterday, but there are some $1.50 seats still to be had.

There is, perhaps, no department in this College so poorly housed at present as the Department of Industrial Art. The drafting-room occupied by Prof. Walters' classes is the poorest room in the whole institution, with regard to light supply, while it should be the best. The attic rooms occupied by Miss Evans are equally unsuitable. When the College gets its appropriation for a new administration and chapel building provision should be made for a suit of class rooms and drafting-rooms for this important department.

Capt. A. S. Rowan, the new professor of military science, was here last Wednesday to make a preliminary call. He had been at Fort Riley to attend the fall maneuvers for a few weeks and passed here on his way to Atchison, Kan., where his family is located at present. He was agreeably surprised to find the institution in such a prosperous condition, and said that he would return, ready for work, on Tuesday of the present week. The captain has a decidedly military look and bearing, and we predict a pleasant and profitable year for our growing College battalion.

The Department of Animal Husbandry has been having some valuable additions to its herd. The noted scrub cow, No. 20, gave birth to a fine heifer calf, sired by the Guernsey bull, Shylock of Darlington. The Shorthorn cow, Mary of Elderlawn, has given birth to a fine bull calf, sired by Golden Champion. The Red Pole cow, Juno 1st, has given birth to a bull calf. Lastly, the Ayrshire, Maggie of Woodroffe, has given birth to a bull calf.

There is probably no time in the year when a thrifty farmer can say that he has nothing to do, but there are times when his work is not so pushing as at others. It is at the time when the work is pushing him the least that he should arrange with his neighbors for a good, rousing, instructive farmers' institute. In many places this is best held in the fall or winter. The State has appropriated $2,000 to pay the expenses of speakers from the Agricultural College in attending and assisting at these institutes. There are three departments, agriculture, animal husbandry, and dairying, that have their duties so arranged that they can give considerable time to institute work in the summer and fall, but on account of very heavy class work from January 1 to April 1, very little institute work can be done after December, although members of other departments may assist to a limited extent through January and February. Localities desiring assistance from the College should write to the chairman of Farmers' Institute Committee, Agricultural College, Manhattan, Kan., at an early date, and find out when help can be secured. The College will also gladly send instructions on how to work up a good institute.

Under the heading, "Two Worthy Promotions," the *Kansas Farmer* has the following good words to say concerning two of the members of our Faculty: "Readers of the *Kansas Farmer* will, without exception, be pleased at the promotion of Prof. D. H. Otis from the chair of dairying at the Agricultural College to that of animal husbandry. The new position still gives Professor Otis control of the dairy herd at the College, and gives assurance of the continuance of the important line of experimentation with the animals and feeds that have in the past been so helpful to the dairy farmer. He has been relieved of the manufacturing part of the work, but in lieu of this will have the beef cattle, the horses, the hogs, the sheep—indeed all the live stock, including experiments with the same, and will give instruction in the science of animal husbandry. Everybody knows this work will be well done and that, if properly supported, the department will be placed in the front rank of its kind in the United States. While regretting the loss of the full services of Professor Otis in the dairy interests, the dairy people of Kansas will be glad to know that the new head of the dairy department is Prof. E. H. Webster, who has been associated with Professor Otis in the work, and whose writings show him to be one of the live, energetic, well-equipped men of the present. Professor Webster is not only an educated man, but a practical man as well. He will give a good account of himself with his enlarged opportunities."

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THE INDUSTRIALIST.

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SOME IMPORTANT POINTS IN PLANT IMPROVEMENT.*

IN the following consideration of the general features that should characterize work in seed breeding and plant improvement, I shall attempt to be as brief as possible, as I understand that the same points are to be treated by others, who in experience and technical qualifications are far more entitled to claim your attention.

I would suggest in the first place, that the work in this field should be based upon a real need of the region wherein it is to be carried on. To a certain extent all plants in any place come within this limit, since, other things being equal, all crops may be regarded as improved by increasing the yield. It would seem, however, that more valuable results would be obtained by singling out some paramount need of one's locality and trying to meet it. Thus in the West, at and beyond the point where red clover can be successfully grown, the greatest need of agriculture has been a sufficiency of nitrogenous forage. Fortunately this need is being rapidly filled by alfalfa, but notwithstanding the increasing dominance of this plant, there is a large field that could be occupied by an annual or biennial leguminous crop to the great advantage of our soil. The breeding of a strain of red clover that would flourish with less rainfall would be a distinct gain to agriculture. It might be stated in a general way, that one of the great aims in plant improvement should be the adaptation of valuable plants to climates different from that to which they are native. Whether this is best accomplished by natural selection, artificial selection, crossing, or by some other means still, must be determined by the circumstances obtaining in each case.

Where there is a distinct need it may be more feasible to improve an existing and flourishing crop than to introduce and adapt one. Thus it is well known that corn, though the grandest of

*A paper read before the section of agriculture and chemistry of the Association of American Agricultural Colleges and Experiment Stations, at the Atlanta meeting.

cereals in many respects, does not furnish a grain that is a properly balanced ration for most purposes, but to yield the best results it must be accompanied by a nitrogenous supplement. It is evident that any increase in the precentage of nitrogen that can be impressed upon this grain will be an advantage, other good qualities remaining unimpaired, and it may amount to a great advantage. Similar considerations may make it advisable, in securing the desired improvement, to work by means of selections of individuals from an existing variety, rather than to originate a new variety.

Another important point that has not been given due weight in all cases in the past is that of chemical composition. An intelligent farmer can do much at improvement by means of selections based on obvious properties, such as color, yield, taste, or hardiness, but it would seem to be especially the field of the experiment stations to do the work in which changes in chemical composition are the chief object. Selections controlled by chemical analysis have yielded most encouraging results whenever persisted in, so far as they have come to my knowledge. The somewhat hackneyed example of the improvement of the sugar beet is still probably our best. Starting in 1888 with Kansas Orange sorghum, which contained on the average 12.62 per cent of cane sugar, the Kansas station, by selection of seeds from stalks shown by chemical analysis of the juice to be richest in sugar, in five years produced a strain that contained over 16 per cent of sugar in the juice as the average of a large number of stalks, and in which the richest stalk contained 19.4 per cent. Fully as marked results were obtained with four other varieties. Similar results were obtained in the same line by the division of chemistry of the department of agriculture. In more recent years the Illinois and the Kansas stations have shown the possibility of controlling the direction of change in the composition of corn by seed selection based on analysis. There can be no doubt that the use of this means of selection may be extended to many other plants with great advantage. It is not unlikely that the public stands in need of education on this point, since it is accustomed to judge by external appearances for the most part. As long as people will buy any kind of an apple that is red, and will pass by Grimes' Golden and Ortley because they are not, there is room for improvement in public standards.

The possibility, or impossibility, of producing an improved strain of a plant at one point and obtaining correspondingly good results with it elsewhere is a problem that must receive most earnest attention. It is my belief that improved varieties will largely have to be developed on the soil and in the climate where they are to be grown. An excellent illustration of disappointing results when an improved variety is grown at some point other than that of origin is furnished by the wheat produced at the Minnesota station and known as M 169. At the home station, as an average for five years it produced five bushels per acre more than the parent stock from which it was selected. At the sub-stations and some other points, however, it gave on the average only one-tenth of a bushel more than the parent stock. Sugar beet seed of the finest quality will not produce high-grade beets on the average Kansas farm. It is evident that with plants, as with animals, the breed is largely in the environment. Further observations are necessary to disclose the extent of our limitations in the distribution of improved varieties with preservation at the same time of their superior qualities.

It is highly probable that the work of the experiment station will not consist so much in multiplying and distributing improved varieties of plants and seeds of its production, as in discovering the methods by which such improvements may be effected, and in acting as a center of influence and a coördinating force through which interest can be maintained and efforts directed in many, perhaps hundreds, of localities in the state. In some instances local associations might be formed to work with the station, but probably oftener an enterprising, progressive and enthusiastic individual will fully, and perhaps better, meet the requirements. He should receive every assistance the station can provide, and the encouragement of such work and workers throughout the state should be an important part of the station's activity.

In concluding, I wish to lay stress upon the importance of basing our standards upon points of economic importance with no regard to those that are purely fanciful. How many breeders of animals have propagated from inferior stock merely because it possessed the color they fancied! Chicken exhibitions furnish striking examples of attachment of undue weight to the marking of a feather or the serration of a comb. The standards advocated for perfection in an ear of corn savor of the same fault. A cylin-

drical ear and cob is insisted on by some, and the claim is made that that form carries a greater percentage of grain than a tapering ear. There is no mathematical basis for advocacy of a cylindrical ear if in the tapering ear the cob tapers proportionately. So, too, straight rows are insisted upon, whereas a spiral or zigzag arrangement of the kernels is equally as good as far as yield goes. The only essential point is the securing of as great a depth of kernel as possible compared with the diameter of the cob, or the ratio of the diameter of the ear to that of the cob should be as large as possible in all cross-sections of the ear, an aim with which tapering or twisted ears are not in conflict. There are, of course, products such as fruits, especially those to be eaten out of the hand, in which the appearance is an important element in the price that they will command. My contention is, that we should set ourselves like flint against the advocacy and the adoption of standards that are not based on economic considerations.

J. T. WILLARD.

FUNCTIONS OF FARMERS' INSTITUTES.

CHARACTER OF WORK.—The farmers' institute is virtually university extension, of which we heard so much a few years ago. The institute work in nearly all the states is either conducted or materially aided by the agricultural colleges, and the latter began this work long before the universities inaugurated university extension. Professor Bailey, in his bulletin on Farmers' Institutes, says that out of the forty-seven states and provinces, twenty-three have the institute work conducted by the agricultural colleges and twenty-four have it conducted by men appointed by state officers, who draw upon the college force for speakers.

SOME COMPARISONS.—The farmers' institute sometimes is classed as a sort of farmers' college, which brings the instructors from the agricultural colleges and experiment stations in closer touch with the farmer, and in a limited way supplies the instruction given the students to the farmers who have been unable to receive a college education, and thus helps to make up for the lack of early training. The agricultural college thus becomes more real and practical to the farmer, and not infrequently the college professors are brought in contact with the farm and farmer in a way to get new ideas and new inspiration that will greatly benefit

the college and the experiment station. In this way the prejudice which the farmers frequently have against the college teachers and experimenters is removed. If the colleges and stations are not practical the farmers should talk it over with the representatives from the institutions and see if their ideas are correct, and if so make suggestions as to where improvement can be made. Colleges and stations should always be glad to receive such suggestions when presented in the proper spirit. If the colleges and stations are not run for the best interests of the farmers, this contact with the farmers at institutes is a great aid in finding it out.

Without an institute or similar organization, farmers' minds are apt to run in grooves; their ideas become hobbies. The institute helps to open their eyes and cause them to reflect, investigate, and perhaps experiment for themselves. It is a place to receive and impart information; a sort of a savings bank where knowledge is both checked out and deposited as capital for future use; it is a place where knowledge as well as earnings can be pooled; it is a school of experience where one farmer changes opinions and experiences with another; and as he begins to relate his experiences, he thinks of other experiences, and will begin to classify them. This sets the mind to thinking logically and encourages a healthy, vigorous, intelligent activity that results in mental growth as well as material prosperity. Hidden talents in himself and others are brought to light.

Social Advantages.—Society is an educator. Bringing people together socially knocks off the rough corners and gives a man confidence in himself. Get an opinion from a young man and you make him a better farmer, yea, a better man. This enables him to appear before his fellows to present his thoughts and experiences; and when a farmer begins to present his thoughts to the public he begins to ask questions, and when he asks questions honestly, for the purpose of gaining information, he is well started on the road to success. This receiving and imparting information is an education in itself, and if carried far enough will make every man a well-educated citizen.

Bringing Specialists to Light.—Every agricultural community has specialists; *i.e.*, one man will raise the best potatoes, another the best corn, another the best wheat. One man will make a brilliant success in dairying, another in stock raising, an-

other in raising calves, another in feeding hogs, another in raising fruit. The institute is not only a search-light for discovering and bringing to light the valuable experiences of these men, but it furnishes an agricultural exchange where the thoughts and results obtained by these specialists can be communicated to those who are just starting out, or who have made a success in these lines of work. Every farmer is, or should be, an experimenter; the farmers' institute gives an opportunity for oral publication of results. In this way notes are compared in the barn, field, garden and orchard, and the meeting, and exchanging of experiences helps the farmers to coöperate with each other to their mutual advantage.

IMPORTANCE OF VERBAL PRESENTATION.—Reports upon various agricultural subjects presented at farmers' institutes are frequently published in agricultural papers and bulletins, but as a rule these published reports are greatly enhanced in value by having been listened to at the institute. Hearing the experiences of another is much more impressive and will stay with a man longer than when he reads about them.

VALUE OF OBJECT-LESSONS.—There is nothing that appeals to a farmer more than an object-lesson. If new methods or new crops are an advantage over the old, it is much more impressive to see this method in actual operation or to see the crops growing. As an example, the writer, in attending an institute in the eastern part of the State, found a farmer who had listened to a talk on alfalfa the year before. He went home, sent for literature on the subject, and put in sixty-five acres. At the institute referred to, he had a sample of his second cutting of hay, which he gave to the writer to use an an object-lesson in his address. As soon as the address was over there was a flood of questions of various kinds relating to alfalfa, and many made the statement that they were going to try it the coming season. Many of these men had heard the address the previous year, but only one was sufficiently impressed to put the recommendation into practice. After a dry season and the success of this one man, a large number were ready to try it. This man's alfalfa was an object-lesson that is doing a great deal of good to the farmers in that section of the State. If they had not seen this alfalfa, and thus knew it would grow on the soil in that neighborhood, no amount of talking would have convinced them. The institute is the means of bringing the

farmers together to see object lessons and act upon them. The same principle holds true in feeding steers and handling dairy cattle, and in raising improved stock.

When farmers get together and talk over experiences, they are warned and prevented from being humbugged by peddlers and agents who are constantly at work trying to sell the farmer something that is either worthless or its value is far below the cost. A good illustration is found in the so-called dilution separators which are being dealt out over the country, at extravagant prices when compared with their merits.

IMPROVING THE WHOLE FAMILY.—The farmers' institute is for the whole family. Women on the farm are in greater need of a change from the daily toils than the men. Unless they get outside thoughts and come in contact with others, their brains grow narrower and narrower, and not infrequently end in insanity. The women, like the men of the community, are divided more or less into specialists, one being an extraordinary good pie maker, another noted for her doughnuts, another for her extra fine cake, another for her uniformly good bread, and still another for her success in raising house plants. Not infrequently women on the farm make splendid records with their chickens. The farmers' institute enables these women to get together and talk over plans and methods and find out why one can make better bread than the other, and why one can raise more chickens than another. In this way, the duties of the household can be elevated and put on a plain where it is considered a high honor to be a good cook or a good housekeeper. There are very few occupations that cannot be made interesting, instructive and elevating when they are conducted with brains.

ENCOURAGING THE RISING GENERATION.—If properly handled and encouraged, the young people will take a great interest in farm work. While the writer was attending an institute in Kansas, four boys came up after his address and talked about the success they had been having with their calves, chickens, hogs, and garden. They took a lively interest in their work and asked questions as to how they could make improvements. When boys or girls take hold of work of this kind they should be encouraged to present their experiences at the institute.

The McHenry county, Illinois, institute has struck the key-note of interesting the boys and girls. They have given the whole in-

stitute for this year entirely to the young people and have offered prizes in the form of premiums that will amount to $500. These prizes are to be distributed to the boys or girls who make the best success in growing corn. Enough seed-corn to plant one hundred hills is sent out by the chairman of the committee to any boy or girl in the county under twenty-five years of age, with instructions for planting, tending and harvesting the crop. This corn will be judged and the young people will describe their method of growing it, at the institute, after which the prizes will be awarded. There is no trouble about getting the young people to stay on the farm when such interesting features as these are introduced for their educational and uplifting value. Interesting the young people is a very important function of farmers' institute work and should receive hearty support.

ASSISTING IN THE FORMATION OF PERMANENT ORGANIZATIONS.—Another function of the institute is to encourage organization and education. The writer finds that wherever an institute is held in a grange community it is invariably a better institute, and other things being equal, the people are better educated and are accustomed to taking part in the program and acting as officers, and they take hold of an institute in a way that is bound to make it a success. They think for themselves and weigh the suggestions of the speaker; they ask questions and are ready to take part in the discussion and bring out the points of interest and value. Whenever an organization of this kind is effected the community is more prosperous, and it is the function of the institute to assist in these permanent organizations as much as possible.

DEVELOPING A WELL-ROUNDED MAN.—Life does not depend entirely upon the dollar. It should be the aim of the institute to develop broad men and women, who have a purpose and a determination to make life a success in the truest sense of the word. The physical, intellectual and moral natures should all be developed. The institute should encourage, uplift and inspire to higher ideals. Cause a man to take a modest pride in himself and his work and his daily duties will become a delight and a study with ever-increasing interest, and not a burden to be unloaded at the earliest possible moment. It will put hope into his bosom, without which no man can succeed.

D. H. OTIS.

A TEST OF ATTENTION.

CERTAIN members of a class in psychology were directed each to take a suitable position in the library and, by means of a watch concealed behind an open book, to keep a careful record of some student who pretended to be studying. An effort was made to mark on a sheet of paper the exact length of time occupied by the student in his successive efforts to study and the interruptions thereto. The investigators were urged to try to be unprejudiced in making the test and to make the situation the ordinary one.

The problem was that of securing some estimate of the concentrative powers of the average student of the Kansas State Agricultural College. The subjects were selected at random, and there happened to be represented among them all the classes, from preparatory to graduate students. While these figures may not be exactly true to the second, they are sufficiently accurate to become a pretty fair index to the character of the work being done in the library, and they seem to indicate that the average student of this College has not got very far beyond the reflex stage of attention. The results are tabulated below:

Table Showing the Result of the Efforts of Twelve Students to Read in the Library.

Subject.	Total Length of Test.		Total Time Studied.		Total Time Lost.		Efforts to Study.			Interruptions.		
							No.	Av. Length		No.	Av. Lgth.	
Number and Sex.	Min.	Sec.	Min.	Sec.	Min.	Sec.		Min.	Sec.		Min.	Sec
1. M	31	52	25	55	5	57	46	0	34	45	0	8
2. M	31	15	21	10	7	5	18	1	10	18	0	23
3. F	45	0	30	0	15	0	8	3	45	8	1	52
4. M	33	0	18	30	14	30	7	2	40	6	1	25
5. M	18	59	12	15	6	44	11	1	5	11	0	37
6. M	28	41	21	36	7	5	18	1	12	17	0	23
7. M	22	5	19	40	2	25	6	3	16	6	0	25
8. F	23	49	20	42	3	7	26	0	48	25	0	8
9. M	10	15	8	45	1	30	8	1	6	8	0	13
10. M	23	45	17	45	6	0	12	1	29	11	0	33
11. M	34	51	31	50	3	1	16	1	59	15	0	12
12. M	22	4	15	30	6	34	12	1	19	11	0	36

The table is self-explanatory. It shows, for example, that during a period of about thirty-two minutes subject number one looked up from his book forty-five times and made forty-six separate efforts to get his mind on the lesson, the average length of time of the efforts being thirty-four seconds. In the majority of instances the subject looked up from the page in order to see who was passing. It is easy to see that the mind would not get a very

clear idea of the subject treated by this method of procedure. This is the worst case in the list; but there is much room for improvement in the best of them.

The two most significant facts emphasized by this test are, (1) the frequent break in the continuity of the thought of the student, and the necessary repetitions and stumblings in an effort to get the meaning of the printed page; and (2) the existence of a habit that becomes more fixed and more difficult to change the longer it is indulged. While this condition is very unfortunate, the students of this College are not necessarily to be censured, for very few of them have ever had an opportunity for any specific instruction in the matter of voluntary attention. It is the opinion of the writer of this article that some very valuable instruction of this kind can be given the student early in his college course and during the regular recitation hours. Who will suggest a method?

It has been found that, when the student reaches the work in psychology during the senior year, he is pretty well confirmed in his habits of attention, and any change therein is much more difficult than it would have been if attempted earlier in the course. One of the greatest needs of the average college student is a better method and more order and system in his work. This little test of attention reveals only one phase of his weakness. I am satisfied that, if there could be given the student during his first year a short course in definite methods of study and mental discipline, the burdens of his college career would be greatly lessened and his labors much more liberally rewarded.

W. A. McKeever.

In driving over Manhattan any of these fine days one will see a great amount of substantial improvement on every hand. Almost in every block one will see from at least one to three or four new residences just completed or in course of erection, or new foundations going in, yards being graded and seeded to grass, etc. By the way, this has been a fine season for this and the growing of ornamental shrubbery and trees, and a great deal has been done in this line. The beauty of it all is, it is not a boom but a good, healthy growth.—*Manhattan Republic.*

There are two hundred fifty-four students enrolled in the carpenter-shop this term.

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PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

Doctor Mayo is having his residence painted.

The private horse sheds west of the engineering shops are being enlarged by three new stalls.

Our football team will play the Fort Riley aggregation October 23 and the Ottawa eleven November 9.

The football team is getting excellent practice afternoons on the north campus, under their efficient instructor.

Judge W. L. Carpenter, of Detroit, Mich., a brother of Mrs. Dr. Mayo, has been nominated by the republicans of that state as a member of the supreme court.

Thos. H. Scheffer, who was recently elected assistant in zoölogy, writes from Cornell University, New York, that he will be at his post in Manhattan on January 1.

The North Central Kansas Teachers' Association will hold its twentieth annual session at Clay Center, November 27 to 29. An enrolment of one thousand educators is expected.

The next number of the College lecture and entertainment course will be a concert by the celebrated Colonial Ladies' Military Band. The troupe comprises twenty high-grade artists.

At the annual meeting at Atlanta, last week, of the Association of American Agricultural Colleges and Experiment Stations, President Nichols was elected chairman of the college section.

The Dairy Department raised the retail price of butter last week from twenty-three to thirty cents, and now there is weeping, wailing and oleomargarine in many of the College boarding-houses.

Prof. C. M. Brink gave a lecture at Commercial Club Hall last Tuesday night for the benefit of the Manhattan Library Association. The subject of his discourse was a rather peculiar one —"The Devil"—but there were no casualties.

Glenn Warner, a College student, went to Junction City Saturday night. He rode the "blind baggage" so he could see the country. Near Fort Riley he fell from the train and nearly lost his life. His friend who was with him took him on to Junction, where his badly cut face was dressed. It isn't always the cheapest, getting something from nothing.—*Republic.*

The friends of Professor Metcalf will be pained to hear that he and Mrs. Metcalf are still detained in Doctor Spencer's hospital, at Junction City. The professor has been suffering for several weeks from a persistent attack of southern fever.

L. A. Fitz stopped off at Manhattan last week for a short visit among his old chums. He was on the road from the United States agronomy farm at Halstead to Washington, D. C., where he will spend the winter in scientific work in the agricultural department.

Capt. A. S. Rowan commenced his military work here last week and the drill ground has been unusually lively since his arrival. The captain will room in the new residence of Doctor Colt, on Houston street, but his family will remain in Atchison for the present.

Congressman Chester I. Long, of the Seventh Kansas district, visited College last Tuesday morning, accompanied by several citizens of Manhattan. He attended chapel exercises and made a brief address to the students, in which he said that the land-grant colleges, and especially that of Kansas, were the glory of the nation.

Prof. Wm. M. Sawdon, for the past three years assistant in the Mechanical Department, has resigned his position to accept a similar one in Armour Institute, at Chicago. Mr. and Mrs. Sawdon were recently married and had just commenced housekeeping. They will sell their furniture and leave for Chicago about November 1. Professor Sawdon is a hard-working and ambitious young engineer whose departure from this College leaves a vacancy that will be hard to fill.

The reception given to Pres. E. R. Nichols Saturday night in the city auditorium was a grand event, participated in by hundreds of students and citizens. Though all the arrangements had been made in a hurry and invitations had been out but a few hours, the hall was filled to the inch and large groups were forced to stand outside, unable to gain entrance. The program consisted of a formal reception, a number of student songs by the Bluemont Quartet and the Ladies Quartet, and short speeches by Judge Sam Kimble, Doctor Mayo, Miss Wilma Cross, F. W. Boyd and W. W. Hutto. President Nichols was greatly affected by the encouraging words of the speakers and responded with a few well-chosen remarks. He said that he was deeply moved by the many expressions of good will. He reminded all that the State expected everyone to do his duty and to be loyal to the best interests of the nation. He emphasized that a large institution like the Kansas State Agricultural College needed the hearty coöperation of many in order to do its work well. At the close of the program student Nielsen, in behalf of the student body, presented the President and his estimable wife with a beautiful bouquet, and the audience joined in singing "America," after which all departed quietly for their homes.

The delegation from this College to the installation exercises of Chancellor F. Strong, of the State University, last Friday, reports an inspiring series of meetings and festivities. The delegation consisted of Pres. E. R. Nichols, Professor and Mrs. Clure, Professors Remick, Eyer, McKeever, McIntyre and McCormick, and Miss Jones. President Nichols was called upon to give a toast at the banquet.

Pres. E. R. Nichols returned from his trip last Thursday, after an absence of twelve days. He had been attending the meeting of the American Association of Agricultural Colleges and Experiment Stations, at Atlanta, and had made a short trip to Florida. On Friday morning he spoke to the students in chapel about his observations in the sunny south. At the close of his address he expressed his disapproval of some of the recent doings of the students and warned them to uphold the good name of the College and to be manly under all circumstances. The vigorous greeting and applause of the student body showed that they were glad to see him back again and that they agreed with him in his sentiments.

David G. Fairchild ['88], of Manhattan, an agricultural explorer of the department of agriculture, has returned from an extensive tour of the world. Mr. Fairchild is assistant to Barbour Lathrop, a Chicago millionaire, who has been for some time conducting an expedition at his own expense in search of valuable seeds and plants for introduction into the United States. Mr. Lathrop works in coöperation with the department of agriculture and makes a gift of his discoveries to the country. He has just finished an extended trip through the Orient, and his assistant, Mr. Fairchild, has returned to the department to write his report regarding seeds and plants secured, after which he will leave, in company with Mr. Lathrop, to continue the work of plant introduction. Mr. Fairchild is not prepared at present to give a statement to the public as to what plants have been secured, or what investigations have been completed, but his report, it is hoped, will come out shortly and the American farmer will have the benefit of the information secured in foreign countries. Upon the arrival of the seeds and plants they will be judiciously distributed by the agricultural department to the various state experiment stations and to other experiments whose qualifications and means recommend them to the department officials in charge of the introduction. Mr. Fairchild is willing to say, however, that the expedition has been a very successful one. Mr. Fairchild does not wish at present to make public the objective point of Mr. Lathrop's next expedition. These trips are always taken with a certain degree of secrecy. Mr. Lathrop will probably leave New York some time during October and Mr. Fairchild will join him later on. Mr. Fairchild is the youngest son of the late George T. Fairchild, for many years president of the Kansas State Agricultural College at Manhattan. He has a sister in Kansas City—Mrs. C. H. Kirshner, of Thirty-sixth and Oak streets.—*K. C. Journal.*

The Horticultural Department has finished its apple harvest and has sold or cellared about two hundred barrels of fine apples. The sweet potato and Irish potato crops have yielded about two hundred bushels each.

Prof. D. E. Lantz has received a barrel of syrup and several boxes of his prairie-dog poisons, and is preparing for another vigorous fall campaign against the hungry rodent tribe. Orders for the "College mixture" are coming in from many parts of the West with almost every mail.

We are in receipt o a very neat reprint from the eighteenth annual report of the bureau of animal industry, on the "Angora Goat Industry." The monograph, except fourteen pages, is from the pen of Geo. F Thompson, formerly a teacher at this College. The pamphlet is illustrated by twenty-four fine half-tones and is a typographical beauty. Mr. Thompson is the acknowledged authority on the subject in this country.

The following article has appeared in the press and has been widely commented upon. It is probably true that some of the land-grant colleges have done but little for military instruction, but the Kansas State Agricultural College is not among them. Our Military Department has always borne a good reputation at headquarters and the College battalion has been highly commended by the visiting officers. "The general order governing the instruction under army officers at schools and colleges throughout the country will cause a good deal of consternation at the institutions to which these new regulations, published from the war department, apply. The order is a result of reports made by the inspectors general of the army, who have been visiting the different schools, colleges and universities where the government maintains an army officer at public expense as a professor of military science and tactics and to which the war department sends each year a quantity of quartermasters' supplies and ordnance equipment for the use of the students in the military department. It has been reported to the Washington authorities that at hardly any of these institutions is the military department regarded as of any importance. The army officers detailed as instructors usually have to find time for their labors outside of the college day, and there are numerous annoyances and inconveniences placed in the path of the officer who is sent to do this important work. The war department has decided that it shall establish certain requirements and compel educational institutions to observe certain rules, and failure to live up to these regulations will result in the army officer being withdrawn from the college as instructor. The order will arouse a good deal of opposition and some remonstrances from a few of the colleges which have not taken kindly to the detail of army professors, and who only have accepted the presence of army officers in the capacity of professors in military science because the service of such an instructor costs the college nothing and was an ostensible compliance with the law."

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DANIEL WEBSTER: THE DEFENDER OF THE UNION UNDER THE CONSTITUTION.

IF to-day a popular vote were to be taken on the question. "Who was the most prominent political genius in American history during the nineteenth century?" a large proportion of the people, possibly a majority, would give their franchise to Daniel Webster, "the god-like Daniel." Not that he was the most popular man; he never became, like Clay, a party's idol. Nor did he reach the highest official position; to the great dignity of the presidency he never attained. And Lincoln may, by some, seem to outshine him; but Lincoln and Webster occupied different spheres. They performed different work. In no sense can they be regarded as rivals for a place in history. Each in his own field was supreme. The fact that each blazes with matchless splendor in the firmament of our republic in no measure diminishes the glory of the other.

In his own realm Webster was without a peer. Towering calm and serene above his contemporaries, he stands majestic and sublime, the one American of the second quarter of his century whose fame increases and grows more distinct as the years roll by. Yet he did not live among mediocre men; he was not surrounded by a race of pigmies. "There were giants in those days." Among his associates were such men as Clay and Calhoun and Benton and Hayne and Choate and Mason; but in the perspective of the years he towers above them all—as Mount Washington stands out to the distant observer above the other peaks of New Hampshire.

Webster was so fortunate as to be born on a farm. Yet in his youth he was not much of a farmer. But he had brains enough to have made him successful even in that calling. The story is told that one day when mowing he said to his father: "This scythe does not hang right." His father fixed it.

Still he said, "It does not hang right." "Well, Dan," replied the swarthy old man, "suppose you hang it yourself." Dan hung it on the limb of a tree, saying: "That is about the kind of a hang I like." Whether it was this episode that Ezekiel Webster had in mind when he said, "Dan was good for nothing else, so father sent him to college," is uncertain, but it is certain that Dan went to college. He was graduated from Old Dartmouth in 1801, being then nineteen years old.

It was while a college student that he was invited to deliver the Fourth of July oration in Hanover, the college town. This invitation was a high compliment for one so young, and is significant as showing that he had already made a reputation as an orator. The speech itself is interesting, not for any profundity of thought nor for the majestic simplicity of style that distinguished his speech in mature life, but rather for the theme of his discourse. This showed the characteristic bent of his mind. In this youthful production he preached love of country, exalted an American spirit and urged fidelity to the constitution as the true corner-stone and bulwark of national strength and permanence. He urged the necessity and proclaimed the grandeur of the union. Thus, while only a boy in college, he sounded the key-note of his entire political life; for these were the underlying principles that guided him and that furnished the themes of his eloquence in his years of greatness.

I may not in this brief sketch follow Webster through all the years of his life after entering college. The story is too long for recital here, and its details are too well known to make its recital necessary. A teacher, a law student in Boston, a successful lawyer, a member of congress, a United States senator, the Secretary of State—these, covering a period of half a century, furnish the outline of his career. And yet how little they reveal of the life! How little of his services and of his sacrifices for his country! How little of his disappointed ambition! How little of the bitter and unjust criticism that he endured! How little of his colossal genius!

Mr. Webster's greatest services to his country were performed in defending and expounding the constitution. He practically gave, so far as the people at large were concerned, a new interpretation to that instrument. It would be too much, perhaps, to say that he originated that view; but his elaborate,

exhaustive and profound development of the doctrine gave currency to an interpretation which at first had held dominion in but few minds.

Whatever may be the opinion now, it is undeniable that in the early days of the republic a very large proportion of the people held the constitution to be a compact between sovereign states, from which any state might withdraw at will. Nor was this opinion held exclusively by members of one party or confined to the southern states. During the second war with England talk of secession was not uncommon among the federalists, who were the legitimate political predecessors of the party that afterwards carried on the war to preserve the union by keeping the seceding states in that union by force. There is good reason, also, for believing that some of the leaders in the famous Hartford Convention, held during the second war with England, were preparing to lead their states out of the union and would have attempted to do so had not peace been made. And that in New England! It remained for Daniel Webster to preach to the nation—north as well as south—a different doctrine, and to weld that doctrine into a system by the Titan-like blows of his remorseless logic. But he did not succeed in converting to his theory all men even in his own party, much less in the opposite party. For, as late as November 9, 1860, when the Southern States seemed on the point of rushing into secession, did not Horace Greely himself, while deprecating their course, nevertheless write in the *Tribune:* "If the cotton states shall decide that they can do better out of the union than in it, we insist on letting them go in peace?"

The best-known speech in which Webster combatted this old idea touching the nature of the union, and set forth the theory that the constitution is not a compact from which any states may withdraw at will, but that it is rather the fundamental law of a nation binding the states together into indissoluble unity—the best-known speech in which he sets forth this theory is the one known as the "Reply to Hayne." Webster had a profound conviction of the importance, indeed the necessity, of the union to the prosperity of the American people. He foresaw that if the old idea of the constitution as a compact were to prevail, the day would surely come when some states would act on that theory, and the union be dissolved. His mission it should be to proclaim a different political gospel. His words were almost like a voice in

the wilderness, but they turned many to repentance and to-day they constitute the creed of the nation.

As a work of oratory the "Reply to Hayne" is without a rival in the history of American political eloquence. It is worthy to rank with the productions of Demosthenes and Cicero, of Chatham and Burke, of Fox and Sheridan. In thought, in literary expression, in delivery, it was supreme.

The speech was pronounced in the United States Senate in 1830. Calhoun, the leading advocate and defender of state sovereignty, had by this time developed and elaborated his theory into a solid and consistent system, fortified and consolidated by all the ingenious arguments that his acute and logical mind could present in favor of the right of nullification as a constitutional principle. Calhoun was at this time vice-president and therefore presiding officer of the senate. His chief lieutenant in advocating his favorite doctrine was Colonel Hayne, of South Carolina. Able, fearless, adroit, with that brilliant and fiery eloquence for which so many southern statesmen have been famed, Hayne was a worthy champion of his cause and an antagonist by no means to be despised. But in Webster he found "a foeman worthy of his steel."

Colonel Hayne made an elaborate speech, in the course of which he set forth the doctrine of nullification with a completeness that it had never before received. But during the preceding years another idea had been growing in the minds of the people—the idea that, whatever the constitution had been at the outset, in 1830 it had become the charter of a nation. It was Daniel Webster's task to present this idea with a completeness of detail, a resistlessness of logic and a masterly eloquence that should leave nothing more to be wished. Who has ever dared to say that he failed in the task?

On the morning of the speech Mr. Bell, of New Hampshire, said to Webster: "It is a critical moment, and it is time, it is high time, that the people of this country should know what this constitution is." "Then," replied Mr. Webster, "by the blessing of heaven, they shall learn this day before the sun goes down what I understand it to be." They did learn; and they have never forgotten the lesson. Webster set forth in noble words the nature of the union, as a large proportion of the common people had come to conceive of that union, and his sentiments went home to the people's minds and hearts with an abiding strength and power. He

showed that the idea of peaceful nullification was a chimera, and that forcible nullification would be revolution. From that day the friends of the union lifted up their heads and walked with firmer and more confident step. The great orator had taken the dead clay of their unshaped and unexpressed thought, had moulded it into form, and had breathed into it the breath of life so that it became a living soul. Thenceforth, until thirty years later, when they had to defend their faith in the shock of battle, amid the thunders of civil war, there was an increasing number who believed with him in "liberty *and* union, now and forever, one and inseparable."

It was during Mr. Webster's later years that the discussion of the slavery question reached its acute stage. The abolitionist sentiment became feverish and at times delirious. Webster agreed with the majority of the people of the north and especially with his own party in New England in opposing the extension of slavery. He had spoken more than once, strongly and positively, against strengthening the abomination. In 1850 the question sprung up again over the application of California for statehood. The flames of sectional strife blazed more fiercely than ever, threatening to consume the fabric of the government itself. The southern members of congress openly talked secession. Angry passions raged; the air was rife with threats of dissolution; disquieting rumors were flying everywhere. It was a time of grave anxiety and dread. The foundations of the Union seemed about to dissolve.

At this crisis Henry Clay came forward with his compromise bill of 1850, the famous "Omnibus Bill." The measure received this name because it was so formed as to include "all" the questions in controversy and "all" the questions whose fortunes must stand or fall with the main issue. The bill as a whole was more favorable than otherwise to the slavery interests. One feature that particulary enraged the abolition element was an article providing for a more rigid enforcement of the fugitive slave law. The debate was earnest and prolonged, and the bill would not have passed had it not been for the support of Mr. Webster.

On March 7 he made, in favor of the compromise, one of the most eloquent of all his speeches. In advocating the measure Webster disagreed with most of his party in the north and with all those who would not under any circumstances make terms

with slavery. This speech was assailed with a storm of criticism and denunciation, the echoes of whose thunders have not ceased to this day. Even one of his recent biographers has not forgiven him. At the time, Webster was criticised with intense bitterness. He was called a traitor to his party, to his country, to the cause of liberty itself. He was accused of having betrayed his own record. He had acted, it was said, in direct violation of his previous course of life and was bringing to a close a long and otherwise consistent and illustrious public career by a deed of treachery and dishonor. They called him Benedict Arnold. They called him Judas Iscariot. All that he had once seemed to hold most dear, they said, he had betrayed to the chief priests of slavery for thirty pieces of silver and had not even received the price of his humiliation and shame. They advised him to have at least the decency of Judas and go hang himself. "How art thou fallen!" they cried, "How art thou fallen from heaven, O Lucifer, son of the morning!" And so they followed him, with their maledictions, to his grave.

Now what was the mess of pottage for which they said this man had sold his birthright? Nothing more nor less than support for the presidency. They claimed that he had proved false to all his past in the hope of gaining the help of the south in securing this object of his ambition.

I may not here discuss at length the merits of this controversy over Webster's seventh of March speech. If it is said that in his previous years he had steadily opposed the slave power and that now on the same question he made an entire change of attitude, I shall not quarrel with the assertion. But is this the last word of wisdom on the subject? It seems to me that there is another view more fundamental. What was the most prominent idea advanced by Mr. Webster during his previous career? Was it not the union under the constitution?

This had been the theme of his boyhood Fourth of July speech when a student at Dartmouth; this was his main contention in his debates with Calhoun on nullification; this was above all things else his object in all his utterances on the slavery question. He objected to slavery to be sure; he objected especially to the extension of slavery, but he objected to slavery and its extension not merely on their own account but more strenuously for the sake of that union to whose perservation he had devoted his great powers.

He objected to the institution because he saw that its existence and in particular the controversies over it would be a perpetual menace to the union, and might ultimately result in dismemberment. Rather than see the union of his affections broken into fragments, into states "dissevered, discordant, belligerent," he would yield something to the defenders of that system which in itself he abhorred. He recognized the fact, moreover, that the people of the south were exceedingly sensitive on the subject of slavery, and would resent every attack upon the institution which they cherished as the source of their prosperity and political power. He felt, too, that the abolitionists of the north had been offensively irritating in their assaults upon slavery, and had manifested a peculiar genius for touching slaveholders "on the raw." Under these conditions he felt that strife could be allayed and the nation preserved in its integrity only by pursuing a course of conciliation. When he made the seventh of March speech he knew the union to be in the gravest peril. Could he stand by and see that cherished union shattered into warring factions, when by advocating conciliation not at all inconsistent with existing laws he could avert such a catastrophe? If he could calm the storm and thereby save the ship, should he refuse to pour the oil which he alone possessed upon that raging sea? To do so would have been criminal.

He chose his course with sublime courage—not to gain votes, but even when he knew that what he was about to say would alienate many of his friends. *He* betray his past in order to win the presidency? Rather, he was faithful unto death. He put to hazard all his hopes—not that he loved power less, but that he loved his country more. Just before the speech he said to an associate that he knew he was about to take a course which would make him many enemies and probably defeat all his ambitions, but that his duty constrained him to pursue that painful way. Surely there was something heroic in such an attitude! Why should we not give some weight to his own statement of his purpose? In the very introduction of his speech, he said: "I speak to-day for the preservation of the union. Hear me for my cause." This was the very essence of patriotism. He sacrificed his ambition upon the altar of his country. They did hear him, and he did preserve the union. By this speech he allayed strife and postponed the civil war eleven years. Had the struggle been

precipitated then the outcome might have been far different. Those years gave time for the growth of public opinion and for the development of resources, so that when the shock came the north was able to meet it. Let the defamers of this great patriot cease their snarling over his grave; and let the whole American people, north and south, exalt his name to a place of highest honor alongside that of the "great emancipator," as the Savior of the union. For the union was preserved, and its existence to-day is due not more truly to Abraham Lincoln than to Daniel Webster.

CLARK M. BRINK.

AGRONOMY—WHAT IS IT?

AGRONOMY being a word that has been in the public eye to a certain extent recently, and being regarded by some as a base supplanter of the good old term agriculture, is worthy of our attention for a time long enough to ascertain what it means, and what reason there is for its existence.

The present use of the word seems to be due to its adoption by a committee on methods of teaching agriculture, appointed by the Association of American Agricultural Colleges and Experiment Stations. This committee made its first report in 1896, which report was printed as circular No. 32 of the Office of Experiment Stations. In this report the committee states that a circular of inquiry which elicited responses from about fifty colleges showed plainly that at that time no standard for instruction in agriculture existed in this country. "There is a bewildering variety as regards the topics taught, the time devoted to each topic, the order in which the different topics occur in the course, the relative amounts of class-room work and laboratory or practical exercises, etc." The committee believed that "toward securing reasonable uniformity in this matter it behooves this association as well as the individual teachers of agriculture to give earnest heed."

The committee in this first report made little recommendation toward the betterment of the condition which it found, further than to urge the necessity for a definite nomenclature, on which it continued as follows:

"One great obstacle to the intelligent discussion of the scheme of agricultural instruction and the methods of agricultural teaching is the lack of a definite nomenclature for the subject. This

confusion of terms is evident in the data collected by the committee, as well as in much of the current discussion of this subject which appears in the public prints. It is obviously not an easy matter to bring order out of confusion in such a case. The committee has not been able to give time enough to this phase of the subject to definitely settle anything even in the minds of its own members. It proposes, however, to suggest for the consideration of the association a tentative scheme for the division of what is commonly designated agriculture in courses of study, into several distinct branches or subdivisions, and for giving each of these branches a definite name, as follows:

"1. Agronomy, or agriculture (technical). Climate, soils, fertilizers and crops—plant production.

"2. Zoötechny, or animal industry. Animal physiology and animal production.

"3. Agrotechny, or agricultural technology. Agricultural industries, *e. g.*, dairying, sugar-making.

"4. Rural engineering, farm mechanics, or farm equipment. Roads, drains, irrigation systems, farm buildings, etc.

"5. Rural economy, or farm management. General policy of management, rural law, agricultural bookkeeping, etc.

"If we can reach a point where the term *agriculture*, as applied to what is taught on agricultural subjects in a college course, shall generally be understood to include at its widest the five subordinate subjects indicated in the above scheme, and in its restricted sense only what applies to plant production, an important step will have been taken in settling the proper boundaries of agricultural instruction, and in fixing the proper sub-divisions of the general subject. It is probable that the substitution of a more definite and technical term for agriculture in its restricted sense would simplify matters. The term agronomy is tentatively suggested as such a term, and the opinion of members of the association on this, as well as on the other terms suggested, is invited."

From the preceding quotation it will be seen that "agronomy" means plant production, and is but one section of agriculture in its widest and usual significance. In the third report of the committee to the association a syllabus of a course in agronomy was presented, also an outline for a course of lectures or a text-book on agronomy. These are too lengthy to be included here, but merit the careful attention of anyone interested in systematic

agricultural instruction. The following are some of the topics: General climatic conditions; plant food and growth; air as a source of plant food; the nature, functions, origin and wasting of soils; properties of soils, chemical and physical; classification, texture, composition and kind of soils; physics of soils as related to plant growth; soil temperature; relation of air to soil; soil water; irrigation; improvement of soil through drainage; drainage methods; conservation of soil moisture; physical effects of tillage; chemical and biological effects of tillage; methods of tillage; fertilizers and fertilizing; waste and renovation of soils; rotation of crops; classification, choice, production and improvement of farm crops; detailed study of each of the crops as to structure, composition, varieties, culture, harvesting, preservation, obstructions to growth, use, marketing, and history. From this it will be seen that agronomy is a good thing for a farmer to be well-informed upon, and that a professor of agronomy is quite in place in an agricultural college.

J. T. WILLARD.

"PATRONIZE HOME MERCHANTS!"

HOW often one sees this in his local paper. Did you ever stop to think how much it means to you? Too many people consider it quite convenient to have a store handy when in need of some of the smaller articles, but when something of more importance is needed, or an article costing considerable, they may save money by sending away from home to some large dealer, or by patronizing some "agent." This may be true to a limited extent, and at certain times, but generally and finally it is not the case. If goods may be bought cheaper of the larger dealers, then help your home merchants to build up a large trade so that they may be able to buy goods in larger quantities, thus getting them at a lower cost and securing the advantage of reduced freight rates by reason of large shipments, and they will give you the advantage. "Competition is the life of trade," and if you give the home man half a show he will sell in competition with others.

Another good reason for trading at home is, that by helping build up your home town you help yourself. A farmer may think he is under no obligation to the town nearest him and can safely send away for his supplies, buy his machinery of "road agents,"

and save money. He may save a small amount on an occasional purchase; but he should stop and consider whether it is to his advantage that the town nearest his farm should be a live, bustling, busy town, where there is a demand for his products. He should realize that the larger the town and the more the stores and the larger the stock carried by them the more taxes will be paid, thus reducing the taxes of the farmer, besides creating a demand for his farm products.

We are under obligation to help one another. "You scratch my back and I'll scratch yours." Not long ago the writer made a purchase of considerable value. He patronized a home firm. He was asked why he did not go to Kansas City or Chicago and save money. We consider we saved money by buying at home. A few dollars more may have passed hands in the transaction; but we felt we were paying money to a firm that is paying taxes in Kansas to support her public enterprises, and incidentally helping to pay our salary. Kansas City and Chicago firms pay nothing toward the maintenance of our public institutions. If this will apply directly in this case, why will it not apply indirectly in every other case? How long would American institutions run and employ American labor if everybody would insist on using foreign-made goods? If our home factories should close down our home laborers would have to migrate. If our home laborers should move out, what would our merchants do? Where would the farmer sell his product? How could capital be kept moving? What would those do who have money invested in mills and factories? Where would the money come from to pay the running expenses of state and municipality? What would become of our grand public institutions? If these are important questions regarding our state and nation, they are of proportionately equal importance locally.

"Patronize home industries." J. D. RICKMAN.

The Experiment Station has distributed bulletin No. 112, on "Fattening Steers Without Hogs to Follow," and bulletin No. 113, on "Baby Beef." These bulletins were prepared last June by Prof. H. M. Cottrell, of the Farm Department, just before he left College. Both are well illustrated and valuable pamphlets.

THE INDUSTRIALIST.

Published weekly during the College year by the Printing Department of the

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PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

This term will close on Friday, December 19.

Doctor Mayo attended the horse and fat-stock shows in Kansas City, Friday.

The pipe line through the heating tunnel is now completed and the steam may be turned on any time.

Doctor Barnes is driving a handsome pair of carriage colts and seems to be quite an expert in handling them.

The mid-term examinations will be held next Saturday. The afternoon classes will take examinations during the week.

The city is making preparations to lay a brick walk on the west side of Juliette avenue, from Poyntz avenue to the Athletic Park.

The new missionary at the Episcopal church will introduce a German service one Sunday afternoon each month, at four o'clock, to which all College people are invited.

I. D. Graham and two sons passed through town Saturday on their way to Topeka. They had been out to McPherson county on a hunting trip and were returning home.

The carpenter-shop is repairing a lot of seventy-seven soda-water cases for druggist George Harrop, of the city. Another lot of one hundred boxes were overhauled a short time ago.

Professor and Mrs. Metcalf, who have been at Junction City for some time under the care of a physician, will shortly go to Trenton, Mo., where they will teach elocution in the college and training school.

The machine shops are finishing up a new water condenser for the Chemical Department. The new Ingersoll air compressor recently purchased for the Mechanical Department was set up by the apprentice boys last Saturday.

Student W. J. Wilkinson met with a painful accident last Friday while working on a lathe in the machine shop. He had the nail of the left ring finger completely torn off. He does not lay the blame on the lathe, but says it hurt like fun.

J. M. Alexander and wife, of Welda, Kan., will move to Manhattan about December 1, and make this their future home. They already have four daughters here: Misses Mamie, Kate and Bessie, who are taking College work, and Miss Clara, who is one of the teachers in the Manhattan schools.—*Herald.*

The football game between the College and Fort Riley elevens last Thursday, at Athletic Park, resulted in a score of six to nothing in favor of the soldiers.

The Agricultural College, with the coöperation of the poultry fanciers of Manhattan and the State, is making preparations for a poultry show at the College, December 1, 2, and 3. Judge C. H. Rhodes, of Topeka, will judge the exhibit and place the awards. The indications are that this will be the largest show in Kansas this year. The exhibition will be held in the large arena of the old barn.

The addition to library hall has been completed and the job will be turned over to the College sometime during the present week, the Board of Regents at their last meeting having authorized the President and Professor Walters to accept it. The librarians and Professor Goodell have moved into their new quarters. The Department of Bacteriology will probably not try to occupy its new class room and laboratory until the heating radiators can be put in place. All the rooms are airy and well lighted. The new reading-room, measuring fifty-seven by forty-two feet, is especially handsome. The INDUSTRIALIST in a future number will bring a description of the building.

The closing of the coöperative dining-room in the basement of domestic science hall is a real hardship to many of the professors and students, and the effects will be felt more as the season advances and the roads become worse. As yet many students are able to walk to their boarding-places or ride a wheel down town; but an hour is so short between two recitations that the time will be insufficient when winter comes. Many students take dinner in boarding-houses close to the campus. Over fifty eat every day at Paulsen's, just south of the library, but a much larger number dine from the lunch basket, which is always a pernicious practice when kept up for months, especially for a growing young man or young woman. We hear that a movement is on foot among the students to start another dinner association.

The annual consumption of water by the College, from the Manhattan city water-works, reaches a total of nearly a million cubic feet. This enormous quantity would fill a swimming pool five hundred feet long, four hundred feet wide and five feet deep, or a skating pond two and one-half feet deep and covering ten acres. A main part of this water is used in the ten extensive water closets; another part is consumed in the lavatories and bath rooms; another fills the large boilers in the power-house; much water is used in the greenhouses, stables, experimental plats, laboratories and the creamery. The College pays for this water at the rate of ninety-three and two-third cents per thousand cubic feet. Assuming that all is used directly or indirectly in the interest of the students and placing the annual enrolment at fifteen hundred, it means an average consumption of water per student of over six hundred cubic feet—a tank full measuring twelve by ten by five feet.

Professor Webster left on October 18 to attend the annual convention of the National Butter Makers' Association, at Milwaukee, Wis., October 21 to 24.

The "local" of the INDUSTRIALIST was the happy recipient of a serenade by an improvised glee and mandolin club last Friday night, and wishes to thank the musicians for their fine music and sweet strains. Come again, students.

The new cattle sheds north of the dairy barn are going up rapidly. A force of four carpenters, assisted every afternoon by a gang of students, are working upon it under the direction of Professor Walters and postgraduate Wheeler. The sheds will be the same size and form as the bull sheds built a year ago.

A number of professors and their wives attended the "christening" of the new gasoline launch at Dewey's Eureka Lake hotel last Saturday afternoon. The dedication speeches were delivered by Hon. J. E. Hessin, of Manhattan, and editor Arthur Capper, of the Topeka *Capital*. Mrs. Quinton, of Topeka, did the naming of the "Topeka," which is one of the neatest and proudest lake crafts we have ever seen.

ALUMNI AND FORMER STUDENTS.

H. M. Bainer, '00, has accepted a position in the dairy of the Vrooman farm, at Trenton, Mo.

Isaac Jones, '94, is in charge of the harvesting of something like a thousand tons of raisins just now, at Etiwanda, Cal.

Fred G. Kimball, '87, who is in charge of what is probably the most arduous and dangerous mail service in United States territory, has been enjoying a well-earned vacation with the home folks.

H. M. Cottrell, '84, is now professor of agriculture in Ruskin College. The catalogue of the college has this to say of him: "The farm has been exceedingly fortunate in securing the services of Prof. H. M. Cottrell, formerly superintendent of Gov. Levi P. Morton's great farm at Rhinecliff-on-the-Hudson, afterward for five years professor of agriculture in the State Agricultural College of Kansas. In the latter position, Professor Cottrell won a reputation second to that of no other agriculturalist in the country. To associate with him on the college farm will be a liberal education in agriculture for those enjoying the opportunity." Ruskin College is located at Trenton, Mo., and is the central institution of the Multitude Incorporated controlling the Western Coöperative Association, the Central Western Coöperative Association, and the Kansas Western Coöperative Company, and affiliated with Ruskin Hall, Oxford, Eng. Mr. Walter Vrooman is the leading spirit in all these organizations. Ex-president Thos. E. Will holds the chair of social science in Ruskin College, and Dr. Frank Parsons is lecturer on political science and practical psychology.

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THE INDUSTRIALIST

ISSUED WEEKLY BY

KANSAS STATE . . . .
AGRICULTURAL COLLEGE

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Local Editor, - - PROF. J. D. WALTERS
Alumni Editor, - PROF. J. T. WILLARD

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THE INDUSTRIALIST.

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LABOR'S CENTURY OF PROGRESS.

THE happy termination, if such it shall prove to be, of the recent coal strike in Pennsylvania marks another important advance for labor in its conflict with capital. The labor problem is considerably more than a century old, but the past century has been one of unusual progress towards its solution, and has been marked by certain striking characteristics.

As to the latter, the most striking characteristic of the labor movement of the past century has been the rise of extended labor organizations, such as had, perhaps, scarcely been dreamed of before, and certainly such as could never have been realized under the conditions prevailing at any time prior to the nineteenth century. Before men had been thrown together in large masses, such as the introduction of the factory system naturally led to, it was impossible to get large numbers of them to act together along common lines. In fact, laborers had not yet learned to think of their having interests in common. But with the large accumulations of capital have come of necessity similar accumulations of laborers. And with the massing of laborers has come, as an almost inevitable consequence, the growth of large labor organizations, numbering their membership by tens and hundreds of thousands. Thus, as examples of combinations on a large scale may be taken the Knights of Labor with its hundred fifty thousand members, the American Railway Union with an equal membership, the American Federation of Labor with its five hundred thousand members, and the United Mine Workers of America, which doubtless ranks next to the last of the above named. It is not difficult to understand, especially since our recent coal strike, what a tremendous power such organizations possess within themselves, independent of all government aid or even in spite of government opposition.

But even more striking than the rise of great labor organizations has been the revolution of public sentiment toward those organizations. For an illustration of the extent of this change let

us briefly contrast, for instance, the attitude of Boston toward organized labor in 1832 with that of the country in general toward such movements now. In 1831 and 1832 labor conventions were held in Boston to consider topics of interest to laborers generally and secure more united action in their ranks in the prosecution of their interests. In response to these conventions and feeble attempts at organization on the part of labor came, in 1832, a meeting of the merchants of Boston, together with the shipowners of that place. They met to deplore the changed attitude on the part of labor toward capital and, more than that, to organize an aggressive movement against labor organizations of any sort. These good people dwelt at length on "the pernicious and demoralizing tendency of these combinations, and the unreasonableness of the attempt [to shorten the hours of labor] in particular, where mechanics are held in so high estimation and their skill in labor so liberally rewarded" as in America. They foresaw in these organizations a menance to the city's future trade. Finally they resolved: "We will neither employ any journeyman who at any time belongs to such combinations, nor will we give work to any master mechanic who shall employ them while they continue thus pledged to each other, and refuse to work the hours which it has been and now is customary for mechanics to work." It should be recalled just here that this was the time when the working day was anywhere from twelve to fourteen or even sixteen hours. The particular movement in question was for a ten-hour day.

Now, at this point contrast the attitude of the Boston merchants and shipowners in the above instance with that of almost the whole country in the recent strike. Merchants as well as laborers, employers as well as employes, have generally united in opposition to the coal operators; and no doubt this has been largely due to the contemptuous manner in which those operators treated the demands of organized labor. Into the merits of the case the public could not go. Whether the miners were right or wrong in their demands, the public undoubtedly felt that these miners had the same right to combine as the operators, the same right to make their united force felt as did their employers, and, if any difference, the public would have said that the right of the miners was even a more sacred right.

It is not the purpose here to justify or condemn anything that was done in connection with the strike, but only to call attention

to the fact that, right or wrong, public sentiment was overwhelmingly on the side of the strikers. So outspoken was the public in its sympathy that it can be safely said that this was the chief cause of the success of the strike. All the persuasive powers and tremendous personal influence of Mr. Mitchell would have availed little to prevent the ruination of their cause in the miners' convention, held last July in Indianapolis, as they struggled with the question of calling for a sympathetic strike of all the miners in the country, had it not been for the influence just here of public opinion. The miners were aware that the public so far was with them, and ready to give them substantial aid in their contest. They were also led to believe that it would be the ruin of their cause to alienate public opinion. Hence the sympathetic strike was never declared. From an attitude of indiscriminate hostility to all labor organizations, therefore, the public has apparently come round to a position of general sympathy with the purpose of such bodies, a sympathy that on occasion can apparently warm up to a very active and energetic support.

Another characteristic of the past century has been the change in the attitude of governments and laws in respect to the rights of labor. In the United States labor has always been free to organize so far as the government was concerned. But in England, during the first quarter of the nineteenth century, all labor organizations were forbidden by law. After this law was repealed the government was still hostile to such bodies. Thus, in 1833, it undertook to break up certain labor combinations that had been formed among farm hands for the purpose of restoring wages to their former level before the recent reduction. Arrests were made, and prosecutions resulted in a number being sentenced to seven years' transportation. This was done without color of law against labor organizations as such. But it was discovered that there was an old law against anyone taking oaths not contemplated by law. And under this law the men were prosecuted and punished. As just said, in this country labor has not had to contend so much with positively hostile legislation as with an unwillingness on the part of our courts to sustain the constitutionality of laws passed for the safeguarding of the rights of the laborer. By this it is not meant that the courts have as a rule been hostile to labor. Such a proposition it would

be difficult to prove, even after admitting the most that could reasonably be said about the extensive use of the writ of injunction. But courts in this country must interpret all legislation in the light of the common law, which we esteem as our priceless heritage from England. Now it so happens that this common law grew up under conditions, so far as the labor question is concerned, quite foreign to the conditions that now prevail. The worst evils that could then be imagined as operating in the commercial world were combinations of any sort in restraint of trade. In those days, too, the right of contract was believed to be best safeguarded when a man was allowed in most respects absolute freedom in contracting to do anything that was not contrary to the laws or public policy of the state. It was difficult to believe that men, if left to themselves, would, as they have done in some parts of the United States in the last year or two, literally contract away all the rights of a freeman, binding themselves over for a term of years to a servitude which in every respect except in name resembles the condition of the colored race before the war. The old common law also is hostile to class legislation, as it should be always, in the original sense of that phrase. The result of all this has been that in many states laws designed for the benefit of certain classes of labor—such as anti-truck laws, laws limiting the length of the working day, laws aimed at the abolition of "sweat shops," and the like, have been declared unconstitutional, because of conflict with some of the well established and long-recognized principles of common law. But the trend of judicial opinion seems now to have turned, and we have a recent decision of the United States Supreme Court sustaining an eight-hour law in one of the states. While in several states anti truck laws are being upheld, as is also now and then the right of picketing in time of strike. Statutes and judicial decisions are also remodeling the common-law principle of the responsibility of the laborer for injuries resulting from the negligence or other fault of the coëmploye. The tendency is to increase the employer's responsibility by allowing the laborer damages for injuries so received.

But space does not permit even the mentioning here by name of any considerable portion of the legislation of the past century in behalf of labor, such as laws for the protection of women and children; providing for better sanitary conditions in shops and

factories; protecting laborers from dangerous machinery; laws providing for weekly payment of wages; exempting the wages of wife and children from attachment; establishing bureaus of labor statistics; establishing industrial schools, and night schools for those who cannot attend during the day, etc., etc.

Even if the lot of the laborer sometimes seems a hard one, surely, in the light of this evident progress of recent years, one would hardly be justified in taking an over-gloomy view of the future of labor, at least in America.

It should be said in conclusion, however, that the people of this country as a whole are not to be regarded as hostile to the demands of labor on the one hand, or to the rights of capital on the other. While wishing to favor neither side as against the just claims of the other, they are patiently trying to find a solution for this great problem. And the chances are that they are a great deal better qualified to reach a safe conclusion, one that will harmonize with the great principles of justice and the permanent interests of society as a whole, than is either one of the two contending parties. And by the people is here meant the disinterested portion (so far as direct interest is concerned), the intelligent, self-respecting and law-abiding citizens whose only desire is to see justice done to all parties.

Finally it might be said if either party, in this conflict of labor with capital, is ultimately going to get something less than its full due, it will most surely be that one which undertakes to ignore or treat with contempt the rights and interests of the third party in the case—the great body of people who are on neither one side nor the other but as consumers are generally expected to make good a considerable portion of the losses sustained by these conflicts.

C. E. GOODELL.

THE KANSAS DAIRY SCHOOL.

DAIRY instruction for the winter of 1903 at the Kansas State Agricultural College will begin January 6 and extend twelve weeks, ending March 27. There will be twelve weeks of strenuous work for the student. The days will be packed full of the gathering of information from text-book and class, and reënforcing the truths thus learned by the work in the laboratory, creamery, cheese factory, and dairy barns. The dairy circulars sent out in the past have always stated that instruction would be

given along two lines, viz., farm dairying and butter and cheese making. Owing to a number of reasons the work has never been given in farm dairying in such a way as to make a distinctive course. The completion of the new dairy barn, the building of a one hundred ton silo and the addition to the dairy herd of a number of pure-bred stock of the leading dairy breeds, make it possible to give a farm dairy course this winter.

The line of instruction will be as follows:

FARM DAIRYING.	Hours per week.
Class Work.	
Agriculture and crop production, one-half term Breeds and breeding of dairy animals, one-half term	5
Feeds and feeding and milk production	5
Farm bookkeeping, one-half term Private butter and cheese making, one-half term	5
Diseases of dairy animals, one-half term Dairy bacteriology, one-half term	5
Industrial Work.	
Testing milk and cream Hand separating and butter making Feeding, and care of milk	20
DAIRY MANUFACTURES.	
Class Work.	
Agriculture and crop production, one-half term Breeds and breeding of dairy animals, one-half term	5
Feeds and feeding and milk production	5
Butter making or cheese making, one-half term Dairy bookkeeping, one-half term	5
Diseases of dairy animals, one-half term Dairy bacteriology, one-half term	5
Industrial Work.	
Testing milk and its products Boiler and engine work Butter making or cheese making	20

The class work consists of one hour's recitation per day on each topic indicated. The preparation for the recitation hour must be made outside of the class time, in laboratory, work room, and at the room of the student. The industrial work is the actual practice work in the various departments.

The students in farm dairying go into the testing laboratories and work out the various problems in testing, repeating the work until they are expert along that line. They use the different makes of hand separators, test them for the quantity and quality of the work they do; handle the cream for making butter as it should be handled on the farm. In feeding and in care of milk the student goes to the barn and does the actual feeding and all work connected with it. The milk is taken to the dairy room,

aerated, cooled, and separated, and prepared for delivery to the creamery. All of this work is made just as practical as possible and is discussed in class room in such a manner that all phases and sides are brought out and developed to their fullest extent. The students do the work. They learn by doing.

In the dairy manufactures course, the work is no less thorough. The students receive and separate the milk, ripen the cream, make the butter, and prepare it for shipment. They make the cheese and maintain the proper temperatures and moisture for its curing.

We want to call the attention of the young men to the opportunity there is offered to all who are determined to excel in either of the above lines of work. There are hundreds of young men starting out to farm for themselves every year who live in dairy communities and will become patrons of some creamery or cheese factory. Many of them will jog along in the old beaten track not knowing that there is within their reach, on their own farm, a world of opportunity the extent of which is almost unlimited. The average cow producing milk for the creamery makes something less than $2 per month, and yet there are many dairymen who are making from $5 to $6 per cow per month. Here is a difference that is worth the while looking up. To many men, skim-milk is worth about as little as so much water; but to some it is worth from thirty to forty cents per hundred for feeding calves and pigs.

Many farmers will sell their feed this year for about one third of last year's values; and yet the same feed given to a good dairy cow will bring last year's prices or better. Think of these things. The dairy short course will help you to solve the differences.

The creameries of Kansas are constantly wanting good men and are paying good wages for such. The dairy school will put them in line for this kind of work. The cost of attending is not great. It need not be over $45 to $50 for the three months for board and room and books.

ED. H. WEBSTER.

The city of Manhattan registered 947 voters this fall, which is a very good showing for her recent boom and growth. Multiply the number of voters by 5—the factor usually employed for finding the number of inhabitants—and you will get 4735. Add to this the whole of the large College family of over one thousand and you will see that Manhattan is all right.

NON-EUCLIDEAN GEOMETRY.

THE ordinary geometry taught in our schools and colleges is known as Euclidean, in honor of the Greek mathematician, Euclid, who wrote the first noteworthy treatise on the subject and whose work has been the basis of all subsequent geometrical teaching. Indeed, such has been his influence that the very name has in many places become synonymous with the subject and the student speaks of studying Euclid. That the presentation of this branch of mathematical truth should follow with such closeness the lines laid down more than two thousand years ago by the old Greek master is perhaps the most remarkable fact in the history of mathematics.

The great body of facts and theorems in geometry is based upon simple elementary statements assumed as self-evident. These are known as axioms or postulates. Euclid laid at the foundation of his geometry twelve axioms and three postulates. Of the axioms the first nine are general, the last three geometrical. After centuries of unquestioning acceptation, the critical spirit of mathematical research began to ask whether these axioms might not possibly admit of demonstration, viz., be capable of resolution into yet simpler statements. In particular a proof was sought for the eleventh axiom, respecting parallels, the statement of which is as follows: "If two lines are cut by a third, and the sum of the interior angles on the same side of the cutting line is less than two right angles, the lines will meet on that side when sufficiently produced." Objection was made to the axiom on the double ground that it can not be considered self-evident and that its truth can be deduced from simpler principles. Near the close of the eighteenth century Legendre tried to establish its independent character and thus remove it from the list of axioms, but without success. After years of fruitless effort in this direction some mathematicians began to believe the statement incapable of proof. Gauss was among the first to recognize that the axiom could not be proved. Finally, about 1830, Lobachevsky, in Russia, and Bolyai, in Hungary, stated conclusively the grounds for the assertion that any attempt to demonstrate the axiom of parallels must necessarily be futile. The reasons lie in the fact that though the axiom holds good in the world-space such as we conceive it, yet other space conceptions are possible wherein the

statement is not necessarily true. The axiom was thus shown to be a mere fact of observation and experience, and hence could not be the result of any process of deductive reasoning.

We are now prepared for a definition of non-Euclidean geometry. On the basis of the preceding sketch, it is evident that the system of geometrical truth established upon Euclid's set of postulates and axioms, in which, however, the eleventh has no place, deserves such a title. In general, any system of geometry builded upon another series of fundamental propositions consistent with or contradicting either wholly or in part those of Euclid may be termed non-Euclidean. From this definition it is clear that there are an indefinite number of kinds of geometry. Among this number certain three systems, denominated by Professor Klein as the elliptic, parabolic, and hyperbolic, are the most important.

It is not the purpose of this brief article to discuss any of these various systems. As remarked earlier, the investigations of the pioneers of the new geometry in their efforts toward concrete representation, led to new conceptions of space. The entire subject is connected closely with that of the curvature of surfaces regarded as positive, zero or negative. Some axioms of Euclid hold good for surfaces of certain curvature, while others do not. Researches along the line of the modern idea of n-denominational space, a generalization from algebra, throw light upon the subject of non-Euclidean systems of geometry.

In this connection the question occurs as to whether the mathematician ought to admit into his thinking a system of truth which has at bottom an ideal conception of which he can form no mental image. The conflict between the Euclidean and non-Euclidean geometers is primarily one over the nature of the axioms themselves. One set of thinkers regards them as laws of thought which an intelligent mind can neither deny nor investigate, and that it is, furthermore, impossible to reason on the supposition that any of them are not true. They have always been found to agree with our observation and their falsity is simply mentally unthinkable. On this view the axioms of Euclid wear the aspect of finality. The other class of thinkers maintains that the axioms of geometry are only deductions from our experience, like the theories of physical science. They are the hypotheses on which the mathematician builds his system of truth. It is the concern of the geometer that this system be logical and

self-consistent. It is the province of the philosopher to ascertain the truth or falsity of the fundamental principles.

There appears also to be a middle ground on which the mathematician must recognize the truth of his axioms in their field of application and at the same time be free to extend his results, if necessary, beyond the point of experience and representation.

Modern mathematics, owing to the high development of algebraic analysis, has exhibited a strong tendency toward complete generalization. The rise and growth of non-Euclidean geometry are in harmony with this movement, and the investigator is not deterred by the ideal and abstract character of the results.

Considerable has been done in this country to make the mathematical reader familiar with the idea of the new geometry, although very few courses on the subject are to be found in the curricula of our universities. Dr. Halstead, of the university of Texas, is a notable contributor to the constantly growing literature in this field. It is not to be expected, however, that the geometry of Euclid, for centuries justly regarded as the classic embodiment of rigorous and elegant demonstration, will soon be supplanted by the new system.

B. L. REMICK.

About a hundred students, mostly from the agricultural course, attended the Kansas City stock show, October 24 and 25. They spent a couple of very profitable days among the cattlemen and their fine stock, and all report a very good time. The excursion was accompanied by Professors Otis and Dickens and assistant Shoesmith. Student Thatcher took a run to Trenton, Mo., on Saturday and Sunday, to visit the three thousand acre farm of Mrs. W. Vrooman, which is now in care of Prof. H. M. Cottrell, formerly of this College. The only thing our boys did not like at Kansas City was the indifference of the show animals to the fine College badges especially gotten up for the occasion by a student committee. The College yell made the right impression, though, and found a hearty response.

The young ladies of the Dewey dormitory gave a dance in the reception room last Friday evening in honor of about twenty gentlemen friends.—*Republic.*

THE INDUSTRIALIST.

Published weekly during the College year by the Printing Department of the

Kansas State Agricultural College.
Manhattan, Kansas.

PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

The boys behaved well on Hallowe'en.

The chrysanthemums in the greenhouse are in full bloom.

The Horticultural Department still has some fine apples for sale.

The Chemical Department has received a shipment of reagent bottles.

The last sample of beets for the season has been tested at the Experiment Station laboratory.

The Manhattan school board has provided new flags, fourteen feet long, for both schoolhouses.

The janitor and his force of assistants have been busy for several days cleaning up the new addition to library hall.

Ex-Regent C. B. Daughters and wife entertained the College family from Lincoln and Brown counties at their home, northeast of the College, Saturday evening.

Professor Walters has presented the College library with three bound volumes of memorial addresses of public men, such as Garret A. Hobart, Richard P. Bland, John Henry Gear, etc.

When at Kansas City, at the stock show, our boys met a delegation of Oklahoma agricultural students, piloted by Professor Burtis, formerly an assistant in our Agricultural Department.

Regent McDowell came down from Smith Center last Thursday afternoon and went to Hays Friday. He examined the many improvements under way and signed the monthly payrolls for the employes and laborers.

J. G. Haney, superintendent of the Hays branch of the Agricultural College Experiment Station, was here last week to confer with President Nichols and the members of the Experiment Station Council. He reports about three hundred acres of fine first yields in Kafir-corn, Indian corn, and other sod crops.

The mid-term examinations, with their trials and tribulations, have come and gone and the professors and assistants are busy figuring out the results. In the meantime a large number of the examinants are waiting with mingled feelings of fear and hope for the "yellow literature" which will soon flood the College post-office. "It is a precious thing to have a good conscience."

The domestic science short-course girls had their first outdoor observation work last week. The fruit plantations and nurseries furnished the topics.

The Horticultural Department has cut down the old cedars directly south of the new Physical Science Hall. The change improves the campus very much.

Many of the older students went home Saturday to assist their fathers, brothers and uncles in "saving the country." All are expected back again on Wednesday.

The painters have repainted the dairy barn and the silo and are now at work painting the roof of the new experimental feed sheds at the north end of the College farm.

The football game last Saturday afternoon in the Manhattan athletic park, between the College team and the eleven from Ottawa University, resulted in a victory for the latter. The score stood seventeen to nothing.

The College Hill W. C. T. U. will give a "Feast of Seven Tables," November 10, for the purpose of raising money to support an India orphan. All are invited to come and have a good time and help the good cause. Place of meeting will be announced later.

The pomology class is working on apple varieties. They have identified, described, made drawings of, and sampled the flavors of twenty varieties, and there are others in the store-room, for use after mid-term. A barrel of Kansas apples sent to Prof. F. A. Waugh, at Amherst, Mass., exchanges for a barrel of Massachusetts varieties.

Prof. H. M. Cottrell, our former professor of agriculture, visited College last Friday on business. He had been in Kansas City, where he had bought one hundred twenty grade Hereford calves for the Vrooman farm, Trenton, Mo., which Rob Cole, '02, will feed for baby beef. He also bought a trio of pure-bred Berkshires, which will be used as a foundation for a pure-bred herd.

E. R. Secrest, '02, who has been at Bozeman, Mont., since Commencement, in the employ of the division of forest management, bureau of forestry, United States department of agriculture, was a visitor Saturday. His work was largely stem analysis, and he goes next week to Washington, D. C., to work up the field data. He reports a most pleasant and interesting summer's work.

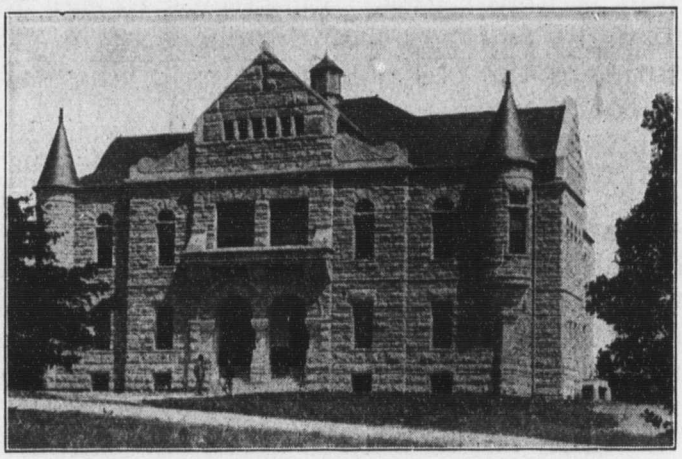
We had a chance to visit Mr. Farman's greenhouse last Friday and were richly repaid for doing it. Mr. Farman has a large conservatory on Bluemont side, near Professor Walter's residence, and makes a specialty of raising chrysanthemums. This year the collection is especially rich. There are several hundred different varieties coming into bloom and the sight of the collection is really wonderful.

Anna Smith Kinsley, '01, joined her husband in Kansas City last week. In the absence of a regular assistant in the Chemical Department, Mrs. Kinsley performed the duties of one during the months of September and October. Upon the arrival of Mr. Shaw, the Experiment Station assistant, it became possible to arrange to have him assist to a certain extent with the College work temporarily, and thus enable Mrs. Kinsley to be relieved. The department is under great obligations to her for her kindness. She brought order out of the chaos of moving, and performed the duties of the position at a very trying time to the satisfaction of all concerned.

Superintendent Rickman has purchased a new four-roller, two-revolution No. 5 "Optimus" press for the Printing Department. This press is manufactured by the Babcock Printing Press Company, New York, and will be modern in every respect. The list price is $4100 and the shipping weight 14,000 pounds. He has also sent in an order for a new quarter-medium "Gordon" job press and a new, up-to date wire stitcher, all from the Great Western Type Foundry, Kansas City, Mo. About $250 worth of job faces of type will be ordered in time to make the shipment with the machinery, which will be the latter part of the month. This is a "starter" for what is hoped to be an entire renovation of the Printing Department. The equipment in this department has been in poor condition for some years, but the superintendent has insisted on making a "clean sweep" rather than by building up by "piece-meal," believing the latter poor business policy, the old equipment being so poor that it would be impossible to use the new with it without ruining the latter.

Mr. Roscoe H. Shaw, who has recently begun his duties as assistant chemist of the Experiment Station, is a native of Maine, though most of his early life was spent in New Hampshire. After graduation from the high school in 1894, he entered the New Hampshire College of Agriculture and Mechanic Arts, from which he was graduated in 1897, completing the four years' chemical course in three years. He spent the two following years in the Federal Polytechnikum, of Zurich, Switzerland, where he had the advantage of studying under Drs. G. Lunge and F. P. Treadwell. He was graduated from that institution in 1899, and in the fall of the same year was appointed assistant chemist to the New Hampshire Experiment Station. He resigned this position a year later to become acting chemist of the Wisconsin station, during the leave of absence of Prof. F. W. Woll, and was at the same time instructor in chemistry in the College of Agriculture. On Professor Woll's return, he was transferred to the chemical department of the College of Arts and Sciences in the University, and in July, 1902, was appointed an expert in soil management in the bureau of soils, United States department of agriculture. When appointed to his present position he was stationed in North Carolina, where he was making a study of the air of the soil. Mr. Shaw is well pleased with the outlook here, and has taken up his work with zeal and enthusiasm.

KANSAS STATE AGRICULTURAL COLLEGE



AGRICULTURAL HALL (There are twelve others).

FIVE FOUR-YEAR COURSES OF STUDY

Each leading to the degree of Bachelor of Science, are as follows:

1. **Agricultural.**
2. **Domestic Science.**
3. **Mechanical Engineering.**
4. **Electrical Engineering.**
5. **General Science.**

FOUR SHORT COURSES

Open to students of mature age who cannot, for lack of time or money, take one of the four-year courses.

1. **Apprentice,** 80 weeks.
2. **Domestic Science,** two fall terms of twelve weeks each.
3. **Dairying,** one winter term of twelve weeks.
4. **Agriculture,** two winter terms of twelve weeks each.

For catalogue or other information, address

Pres. E. R. Nichols, - - Manhattan, Kan.

Volume 29. *Number 7.*

The Industrialist.

Farmers' Short Course and Dairy Course.

Manhattan, Kan.,
1902.

ENTERED AT THE POST-OFFICE AT MANHATTAN, KAN., AS SECOND-CLASS MATTER.
ACT OF JULY 16, 1894.

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Winter Term, 1903, Twelve Weeks.

MONDAY, JANUARY 5.—Examination for admission, at 9 A. M.
TUESDAY, JANUARY 6.—Winter term begins.
TUESDAY, JANUARY 6.—Short courses in agriculture, horticulture and dairying begin.
SATURDAY, JANUARY 24.—Annual inter-society oratorical contest.
SATURDAY, FEBRUARY 14.—Mid-term examination.
THURSDAY AND FRIDAY, MARCH 26, 27.—Examination at close of term.

Spring Term, 1903, Eleven Weeks.

MONDAY, MARCH 30.—Examination for admission, at 9 A. M.
TUESDAY, MARCH 31.—Spring term begins.
SATURDAY, MAY 9.—Mid-term examination.
TUESDAY AND WEDNESDAY, JUNE 16, 17.—Examination at close of year.
JUNE 14 TO 18.—Exercises of commencement week.
THURSDAY, JUNE 18, AT 10 A. M.—Commencement.
JUNE 19 TO SEPTEMBER 16.—Summer vacation.

Fall Term, 1903.

WEDNESDAY, SEPTEMBER 16.—Examination for admission, at 9 A. M.
THURSDAY, SEPTEMBER 17.—College year begins.

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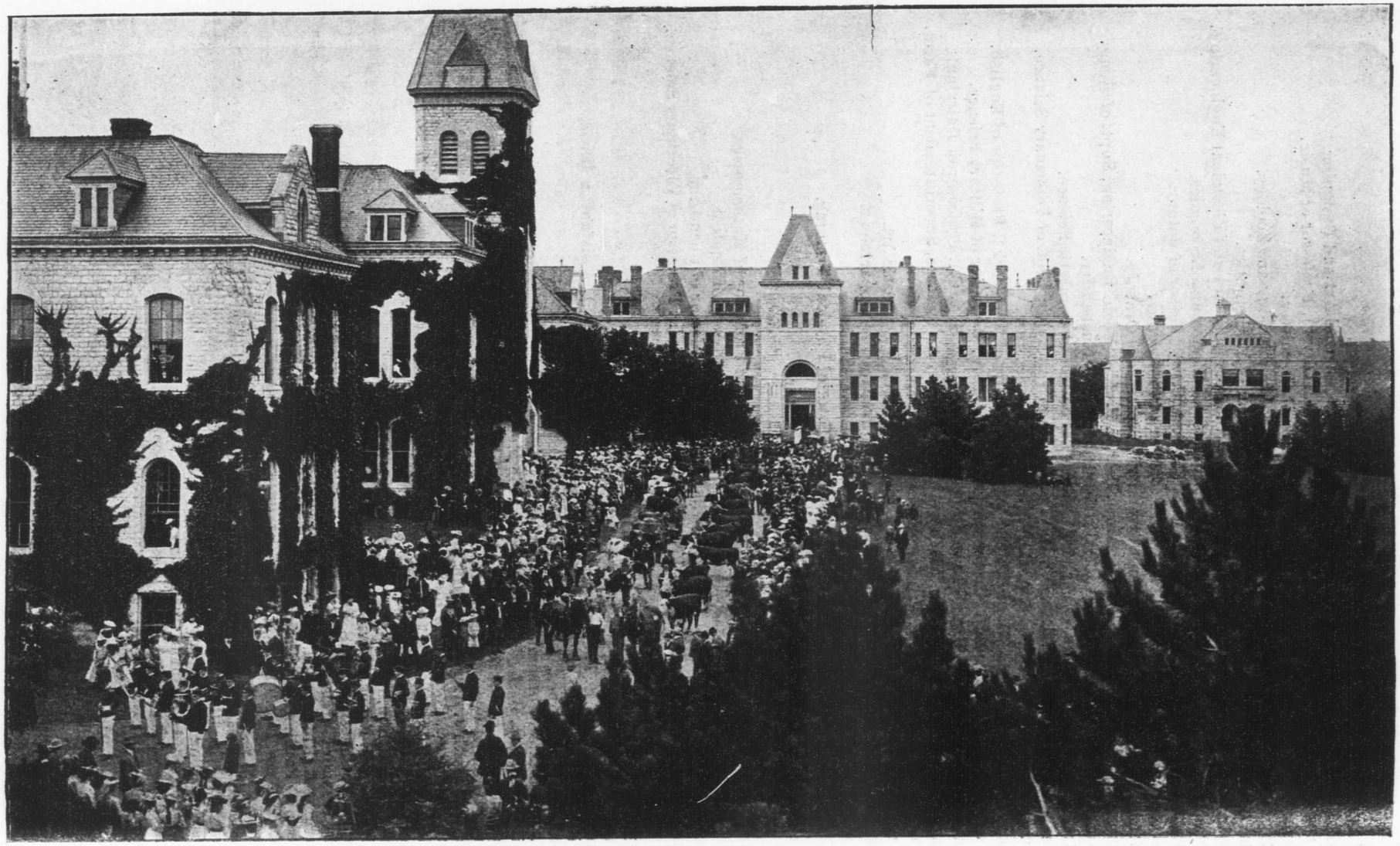
William R. Lewis, Janitor.



A STOCK PARADE AT THE AGRICULTURAL COLLEGE

KANSAS STATE AGRICULTURAL COLLEGE,
MANHATTAN, KANSAS.

FARMERS' SHORT COURSE.

JANUARY 6 TO MARCH 27, 1903.

The Short Course is designed for those farmers and farmers' boys who cannot spare the time or the money to take our regular four-year course. The time required for the FARMERS' SHORT COURSE is two winters, twelve weeks each, coming at a time of year when men on farms can best leave their work. Instruction is given in crop-production, feeding and breeding, orcharding, gardening, and farm shop work. Diseases of farm animals, the study of bacteria and insects, botany, chemistry and physics are treated from a strictly practical standpoint. The aim of the course is to give instruction which will enable the student to grow larger and better crops, increase the fertility of the soil while taking paying crops from it, secure cheaper and greater gains in feeding, maintain the health of the animals on the farm, improve the quality of all the products of the farm, and market them to the best advantage.

SUCH A TRAINING PAYS.

Putting his knowledge of crop-production and botany together, one of our students, by a simple method of crossing, has increased his yield of corn ten bushels per acre. Wheat experiments conducted at this College for eighteen years show that proper preparation before seeding increases the yield forty per cent. Steers fed the ordinary ration fatten in from five to seven months; on a balanced ration they are ready for market in from 80 to 100 days, and a feeder who knows how can produce a balanced ration as cheaply as the ordinary one. The College purchased half of a farmer's herd of hogs, taking a fair average of the lot. We fattened these hogs in fifty days, while the farmer, doing the best he could, marketed his in 110 days. We spent less for feed and had risk from disease for less than half the time. By feeding alfalfa hay with grain to fattening hogs the College secured 868 pounds of pork per ton of hay fed. It pays to know what type of animal gives best results for feed consumed. In 1898 a scrub cow of the dairy type gave the College milk worth $40.37 above cost of the feed, while another scrub not of the dairy type yielded milk during the year worth $6.25 less than her feed. On many farms in a single year the cost of taking this course could be saved by the knowledge gained in our carpenter and blacksmith shops. Inoculation is an almost sure preventive of blackleg. Students taking the Farmers' Short Course perform the work of inoculation in the College feed-lots.

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MANHATTAN, KANSAS.

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JANUARY 6 TO MARCH 27, 1903.

The Short Course is designed for those farmers and farmers' boys who cannot

State Dairy Association

MANHATTAN, KAN., March 3, 4, 5 and 6, 1903

The State Dairy Association will meet at the College during the week of judging dairy cattle. Prominent dairymen from outside the State will be in attendance.

FINAL REPORT.—The final report will be made on the **contest herd.** The cows will be on exhibition and for final judging. The program will be of special interest to the Kansas milk-producer. This is the farmers' opportunity to see the Agricultural College. Reduced rates on all railroads.

For further particulars relative to the association, address the secretary,

T. A. BORMAN, Topeka, Kan.

base for less than half the time. By feeding [illegible]

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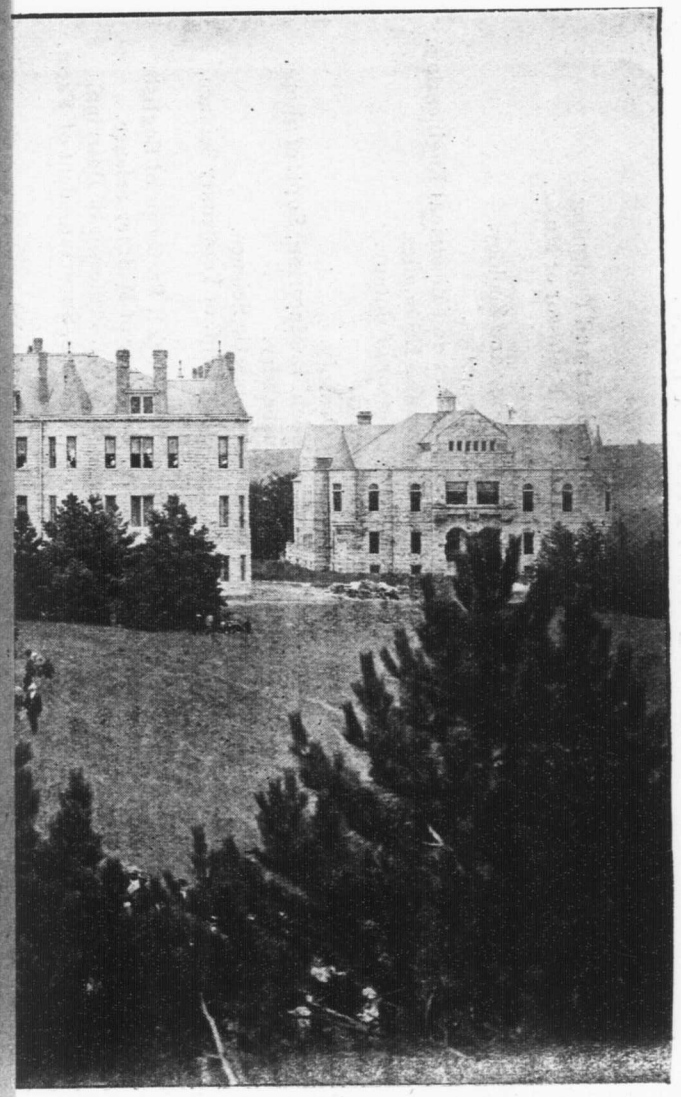
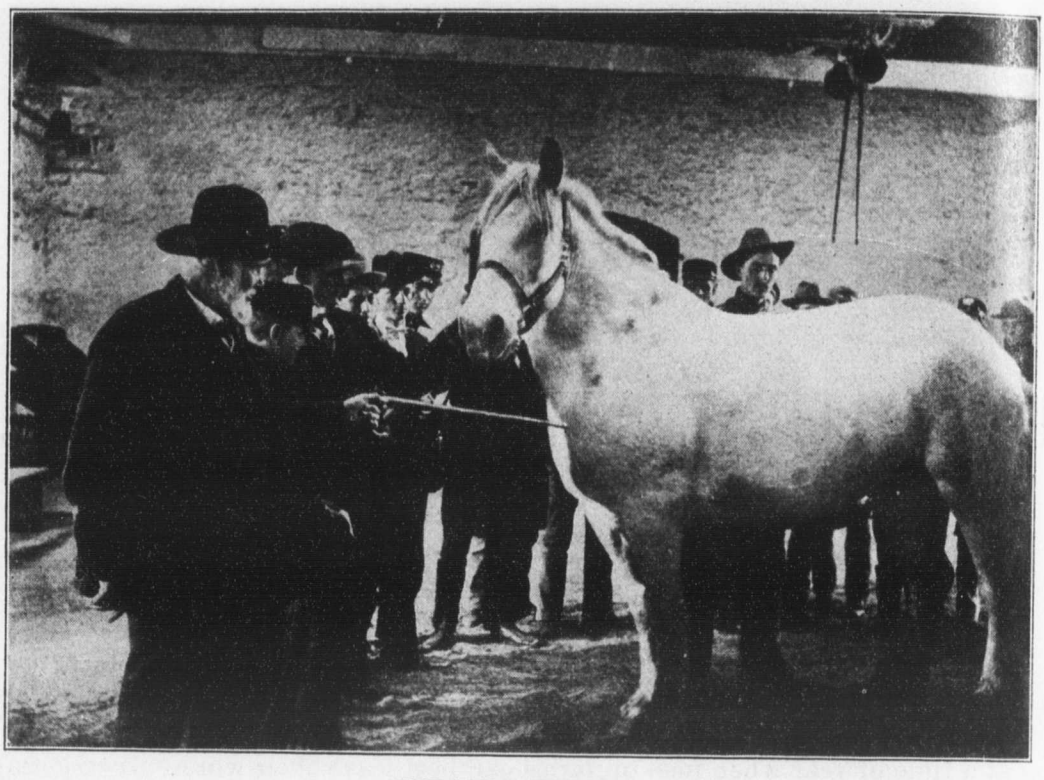


COLLEGE



JUDGING HORSES.

STOCK JUDGING.

Poultry	February 16–21.
Beef Cattle	February 23–28.
Dairy Cattle	March 2–9.
Swine	March 9–14.
Horses	March 16–21.

The special feature of the short-course work will be stock judging. The College owns good representatives of ten breeds of cattle—Aberdeen-Angus, Galloway, Hereford, and Short-horn, representing the beef breeds; Ayrshire, Guernsey, Jersey, and Holstein-Friesian, representing the dairy breeds; and the Polled Durham and Red Polled, representing the dual-purpose breeds.

Twenty-five Kansas breeders have donated pure-bred pigs to the College, each breeder sending what he considered a model animal, and it will be a rare opportunity to study the ideals of these successful men. Four breeds are represented.

A number of breeds of poultry are represented on the College farm, and Manhattan fanciers will loan the College all the birds needed for thorough work in scoring.

The College owns some Percheron mares and has secured the loan of some of the best horses in the state for use in the work of judging horses.

Special instructors in this judging work are secured from the most successful in their lines of work in the country.

ADMISSION.

Persons at least eighteen years of age and of good moral character are admitted to these courses as follows:

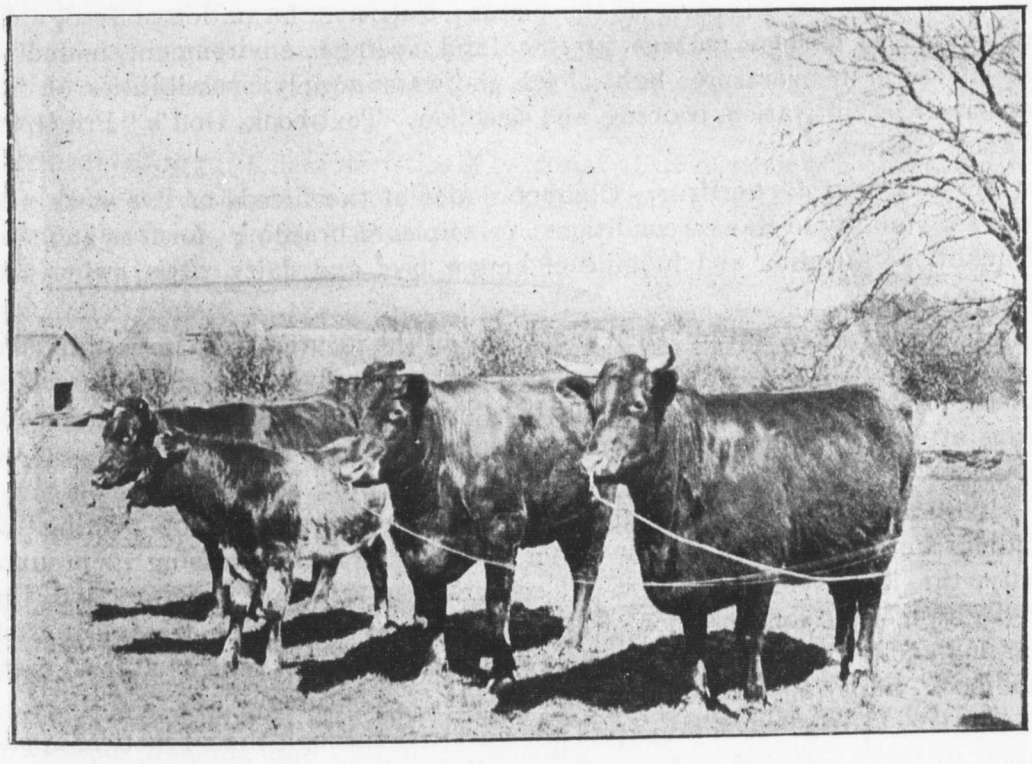
Persons between the ages of eighteen and twenty-one will be admitted upon presentation of common-school diploma, grammar-school certificate, teacher's certificate, or high-school diploma, or upon passing an examination in the fol-

lowing subjects: Reading, writing, spelling, arithmetic, grammar, geography, physiology, and United States history. Persons over twenty-one will be admitted without examination, but should have sufficient education to enable them to understand the simple text-books used and to handle readily problems in common and decimal fractions and percentage. They will be required to attend strictly and constantly to their duties, or leave. They have the same free use of the College library that other students have. Owing to the peculiar nature of the work and to the slight degree of preparation which it assumes, ***students are required to be present at the very beginning of the course, and those applying later will not be admitted.***

The short courses are in no sense equivalent to the long courses, and no one should take a short course who can take a whole or even a part of one of the long courses. All of the common-school branches are taught each term; all of the first-year subjects, except elementary botany, which is not taught during the winter term, and nearly all of the second-year studies, are taught each term; so that it is possible for one to get nearly all subjects of the first two years by attending during the winter terms only.

EXPENSES.

Tuition is free; board and rooms can be secured for $2.50 and upward per week; laundry costs about fifty cents per week. Incidental expenses may be high or low, as the individual determines. The total of all expenses for the entire time, exclusive of railroad fare in coming and returning, need not exceed forty dollars. Students in the short course cannot expect to earn any part of their expenses while at the College, as every hour will be needed for class work, practice work, or study. Any bright, earnest young man can save during the summer sufficient money to take a winter's term here.



COLLEGE SHORT-HORNS.

COURSES OF STUDY.

First Year (Winter Term, Twelve Weeks).

Feeds and Feeding	5 hrs. per wk.
Horticulture, Entomology	5 " "
Crop-production, Bookkeeping	5 " "
Diseases of Farm Animals, Bacteriology	5 " "
Breeds and Breeding	5 " "
Blacksmithing, Repairing	10 " "
Science Lectures	1 " "

Second Year (Winter Term, Twelve Weeks).

In the second year the course divides, and the student can take either the course in agriculture or the course in horticulture, as he desires.

AGRICULTURE.

	Hrs. per wk.
Orchard Treatment, Pomology	5
Dairying, Farm Architecture	5
Botany	5
Physics and Chemistry	5
Shops, Farm Carpentry, etc	10
Farm Practice	5
Science Lectures	1

HORTICULTURE.

	Hrs. per wk.
Vegetable-gardening and Small-fruit Culture	5
Orchard Treatment, Pomology	5
Diseases and Insects	5
Physics and Chemistry	5
Shop, Farm Carpentry, etc	10
Horticultural Practice	5
Science Lectures	1

OUTLINE OF STUDIES.

FIRST YEAR.

Feeds and Feeding. The properties of feed stuffs, and their combination to secure good returns at least cost with products having the desired qualities; effect of feeds on quality of products; construction of farm buildings and appliances to secure best returns from feed and for saving labor; a study of the feeding on the College farm. Text-book, Henry's "Feeds and Feeding." Lectures.

Horticulture. General principles underlying plant growth; structure and functions of the various parts of the plants; nutrition, formation of seed, etc.; propagation by seedage, cuttage, graftage, and layerage; environment, including the effects of temperature, light, food, and water-supply; possibilities of improvement by cultivation, training, and selection. Text-book, Goff's "Principles of Plant Culture."

Breeds and Breeding. Characteristics of the breeds of live stock and their adaptability to Kansas conditions; principles of breeding; form as an index of qualities; selection and judging of horses, beef and dairy cattle, swine, and poultry.

Entomology. Nature, time and extent of the injuries from insect life, and a knowledge of the remedies, when and how to apply them. Structure of a number of insect types; study of the beneficial insects, and the more injurious forms attacking farm, orchard and garden crops. Use of preventives and insecticides.

Crop-production. A study of the soil, the plant, and crop-growing, including the management of the soil for maintaining and increasing its productivity, the improvement of worn-out soils, conservation of moisture and the preparation of the soil, selection of the seed, method of planting, treatment after planting and harvesting of Kansas field crops to secure best returns at least cost. Text-book, Bailey's "Principles of Agriculture." Lectures.

Bookkeeping. The principles are mastered through their practical application to forms adapted to farm affairs. Each student keeps a regular set of

JUDGING POULTRY.

books, in which accuracy and neatness are not less important than a correct understanding of principles. A set of books is developed which would be practical for every farmer, accounts being kept with various departments of his business —fields, granaries, garners, orchards, hogs, cattle, milch cows, etc.

Diseases of Farm Animals. The common ailments of farm animals are discussed, their causes and symptoms explained, and preventives and remedies suggested. Inoculation against blackleg will be performed by the student in this course.

Bacteriology. Characteristics of bacteria; their relation to health and disease of man and animals, to soil fertility, and to quality of dairy products; principles and methods of disinfection.

Blacksmithing. Forging and welding, construction of singletree clips, wagon ironing, clevises, horseshoes, sharpening and tempering plows and tools, general repair work. Advanced work is also offered in the care and management of boilers and engines. If the student desires, he can make a forge and set of blacksmith tools to take home with him, paying only for the iron used.

Science Lectures. Lectures will be given in both the first and second years of the course by the instructors on subjects of most interest to the students in this course.

SECOND YEAR—Agriculture Course.

Dairying. Milk: its secretion, nature, and composition; causes and conditions influencing the quality and quantity of milk; handling of milk for the market and for butter-making, including milking, straining, aerating, cooling, preserving, and shipping; creaming of milk by gravity methods and by the separator; cream ripening and churning; washing, salting, working, packing and marketing butter. Text-book, Wing's "Milk and its Products."

Farm Architecture. Each student will be required to prepare plans, elevations, sections, detailed drawings and specifications of a sanitary farm barn, with outbuildings.

Orchard Treatment and Pomology. Same as in horticulture course.

Botany. The laws of plant growth which have a direct bearing upon the raising of grasses, grains, clovers, forage-plants, and weeds; a study of the common fungi that affect cultivated plants; seed-testing; practical methods of farm seed-breeding.

Physics. A consideration of the principles of physics which underlie farm operations, farm mechanics, control of soil moisture, physical laws of tillage, meteorology. A knowledge of the law of physics enables the farmer to store moisture and to reduce loss of water from the soil by evaporation. It is the practical application of these laws that will solve our drought problem.

Chemistry. The relation of soils to earth, air, and water, formation and characteristics of different kinds of soils, soil enrichment and improvement, the chemistry of feeds and of animal products.

Farm Carpentry. Elementary woodwork in joinery and construction, followed by general woodwork and carpentry, care and use of farm machinery, the building of frame structures, such as stables, piggeries, poultry-houses, ice-houses, and farm creameries, will be given both by lectures and by practical work.

SECOND YEAR—Horticulture Course.

Vegetable-gardening and Small-fruit Culture. The first half of the term is devoted to vegetable-growing, consideration being given to the raising of vegetables for home and market; locations, soils, fertilizers, tools, irrigation, etc., best suited for crops grown in kitchen- and market-gardens; the growing of extra-early or late crops, their special treatment, cultivation, and harvesting; the means employed in the preservation of vegetables for future use; vegetables suited to Kansas conditions, methods of improvement, etc. Small-fruit culture occupies the second half of the term. The subject is treated in much the same manner as vegetable-gardening, taking up the cultivation of small fruits and the methods employed in their propagation, handling, and improvement. Five hours per week. Lectures.

Orchard Treatment and Pomology. This branch is devoted to the practical treatment of orchard work; location, soil, planting, pruning, cultivation and fertility of the orchard; a study of the use and value of windbreaks—how best made, trees suitable for same in Kansas; causes of plant variation and methods employed in the improvement of orchard fruits; grape-growing in the West, a study of the distinctive characteristics of varieties, their value for home and market use; lists of varieties of fruits suitable for Kansas orchards; a general treatment of planning the grounds, location of houses, barns, gardens, orchards, lawns, fields, etc. Five hours per week. Text-book, Bailey's "Principles of Fruit-growing." Lectures, with library references.

Orchard Diseases and Insects. The work of this branch is the investigation of various orchard pests. Life-history and depredations of insects and fungous diseases attacking horticultural crops, together with means of combating them, preventives, and remedies; mechanical devices, spraying compounds and machinery, and methods employed in the warfare.

Chemistry and Physics. Same as agriculture course.

THE DAIRY SCHOOL.

JANUARY 6 TO MARCH 27, 1903.

We have expended $25,000 in an agricultural building, $10,000 for dairy apparatus, and $5000 for a dairy herd and shelter. During the last year a number of pure-bred animals, representative of the Guernsey, Jersey, Ayrshire and Holstein-Friesian breeds, have been added to the dairy herd. A 100 ton tank silo has been built, for the storage of feed for the herd. The dairy barn is equipped with the latest pattern Drown stall, and other modern conveniences.

The dairy building is equipped with the best up-to-date machinery for butter- and cheese-making. This gives Kansas one of the best-equipped dairy schools in the United States. The school will be held January 6 to March 27, 1903.

Kansas offers ideal conditions for profitable dairying—mild climate, short winters, fertile soil, cheap feeds, and good markets. The mild winters necessitate cheap shelter only. Kansas butter can be delivered in good condition to our best Eastern markets for one and one-fourth cents per pound—a lower rate than that paid by many Eastern farmers situated within 100 miles of these markets. Kansas butter can be delivered to Rocky Mountain markets for two cents per pound, and to English markets for less than two cents per pound. A good market is opening in China and Japan.

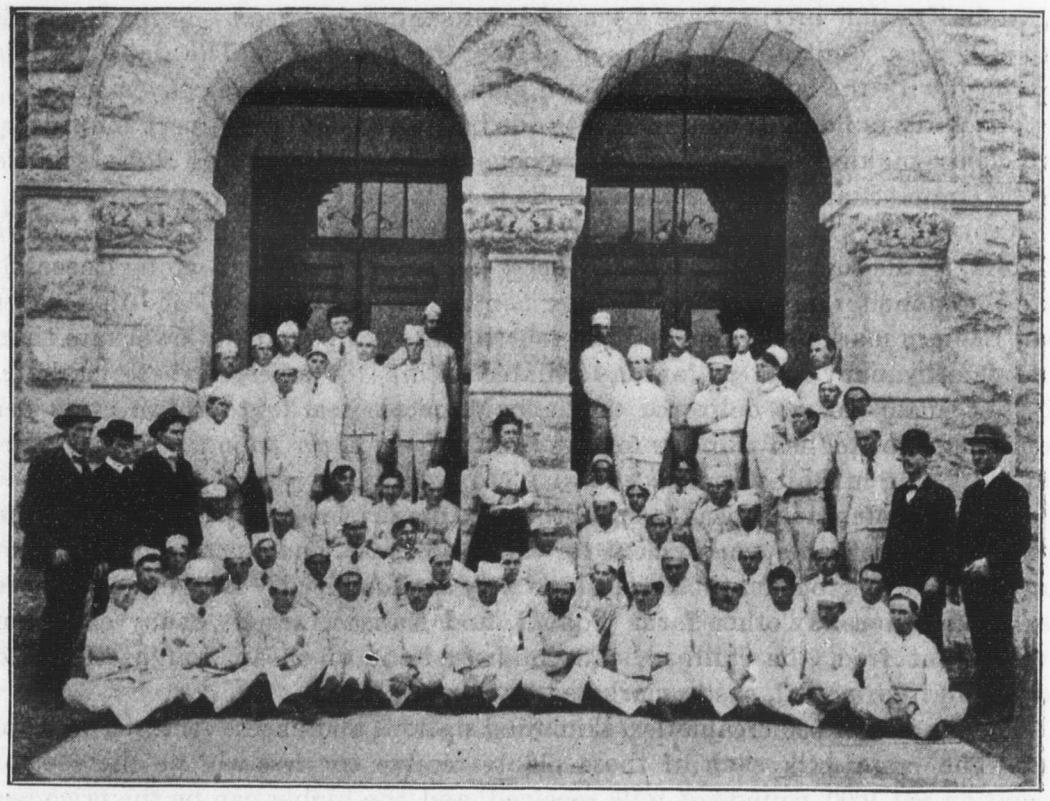
Dairying offers to Kansas farmers the advantage of monthly cash returns the year round, profitable employment for the entire year, and a good home market for the farmers' crops on the farm where they are produced. Butter brings more per pound than any other farm product, and Kansas farmers, many of whom live distant from the railroad, can condense tons of cheap, rough feed into pounds of high-priced, easily marketed butter.

There are over 500 creameries, skimming stations and cheese factories in Kansas. The more milk each of these plants receive the less will be the cost of operation per 1000 pounds of milk received, and the higher can be the price per pound paid for butter-fat. To be most profitable to the farmers of the state, these plants must receive ten times their present supply of milk. The greater the production of milk and butter-fat in the state the greater will be the profits to all connected with the dairy interests. Kansas is well equipped with dairy manufacturing establishments, but the milk supply is much too small to make dairying most profitable. For these reasons, the chief work of the Kansas dairy school will be to give instruction to farmers in milk-production, including the selection of the cow, handling and feeding her, the care of her milk and calf, and the feeding of skim-milk, buttermilk and whey to secure greatest profit.

Kansas cows have been bred chiefly for beef. Secretary Coburn reports the average yearly value of the product of the Kansas dairy cow to be $9.65. Several creameries report that the average receipts per cow per year for their patrons is $20. This College secured, in 1898, an average per cow of $37.75 for butter-fat, at creamery prices, from a scrub herd that in quality were much below the average cows of the state; and one scrub cow, for which we paid $30, returned $60.88 for butter-fat, and gave a net profit above cost of feed of $40.37.

These records show that, with the cows that they now own, Kansas dairymen can with proper care and feed double and treble the present milk yield and make an even greater increase in their net profits. We want farmers and farmers' boys from every township in Kansas to attend our dairy school and learn to feed and handle cows so as to secure these results. Kansas dairymen buy thousands of tons of mill feed. Those who know how secure the highest milk yields with feeds grown on the farm. Come and learn how.

After the Kansas dairyman has learned to feed and handle the cows he now owns, he can still farther increase his profits by selection and breeding. T. A. Borman, Navarre, Kan., after six years of selection and breeding, selling his milk to a creamery, secured an average income per cow of $81.17. You can do as well when you know how. Come to the dairy school this winter and learn.



DAIRY CLASS.

TWO COURSES OFFERED.

The work of dairying is divided into two generally distinctive lines—the production of milk, and the manufacture of milk into the various market commodities, butter, cheese, pasteurized milk and cream, etc. In keeping with this distinction, we offer two courses—farm dairying and dairy manufactures.

Dairy Manufactures.

Agriculture and Crop-production ..... one-half term Breeds and Breeding of Dairy Animals..... one-half term	5 hrs. per wk.
Feeds and Feeding, and Milk-production	5 " "
Butter-making and Cheese-making..... one-half term Diseases of Dairy Animals..... one-half term	5 " "
Dairy Bookkeeping..... one-half term Dairy Bacteriology ..... one-half term	5 " "
Industrial: Testing ..... Boiler and Engine Work..... Butter-making and Cheese-making.....	20 " "

Farm Dairying.

Agriculture and Crop-production ..... one-half term Breeds and Breeding of Dairy Animals..... one-half term	5 hrs. per wk.
Feeds and Feeding, and Milk-production	5 " "
Bookkeeping..... one-half term Private Dairying..... one-half term	5 " "
Diseases of Dairy Animals..... one-half term Dairy Bacteriology ..... one-half term	5 " "
Industrial: Testing ..... Separators and Butter-making..... Feeding and Care of Milk	20 " "

OUTLINES OF STUDIES.

Agriculture and Crop-production. Relation of dairy farming to agriculture in general. Special dairy-farming feeds to grow for dairy animals. Ensilage; the construction and filling of silos; best crops for silage. Rotation of crops; preservation of forage and grain crops. Maintenance of soil fertility as related to Kansas conditions.

Breeds and Breeding of Dairy Animals. Characteristics of leading breeds of cattle and their adaptability of Kansas dairy farming; dairy farm and the selection of dairy animals; care and management of the dairy herd; principles of stock-breeding; scoring and comparative judging of dairy cattle.

Feeds and Feeding. Properties of common feed stuffs, their effect on the character and yield of milk and butter, and their adaptability to Kansas conditions of dairying; the compounding of dairy rations to secure good yields at least cost with products having desired qualities. Careful study of the feeding of the College dairy herd will also be required. Text-book, Henry's "Feeds and Feeding."

Milk-production. Milk—its secretion, nature, and composition; causes and conditions influencing the quality and quantity of the milk.

Dairy Bookkeeping. Practice in bookkeeping that will enable the student to understand the underlying principles, followed by training in keeping books for farm, dairy and creamery accounts.

Butter-making. The handling of milk for the market and for butter-making, including milking, straining, aerating, cooling, preserving, and shipping; testing; creaming of milk by the separator; cream-ripening and butter-making. Text-books, Wing's "Milk and its Products," Farrington & Woll's "Testing Milk and its Products."

Cheese-making. The handling of milk for cheese-making; contamination, aeration, enzymes, rennet, making of Cheddar cheese, cutting and heating curd, drawing whey, dripping and milling the curd, salting and pressing the curd, curing and packing the finished cheese, construction of cheese factories. Swiss, limburger, Edam, and cottage cheese. Text-book, "Cheese-making," by Decker.

Bacteriology. Relations of bacteria to methods of keeping milk, ripening cream and cheese, and flavoring butter; diseases of milk, their relations to the health of man and animals; principles of disinfection. Text-book, Russell's "Bacteriology." Lectures.

Diseases of Cattle. The common ailments of calves and dairy cows are discussed and their causes and symptoms explained, remedies and preventives suggested, all from a practical farmer's standpoint. During the dairy school the College herd will be tested with tuberculin and the students taught how to make the test.

Industrial and Laboratory Work.

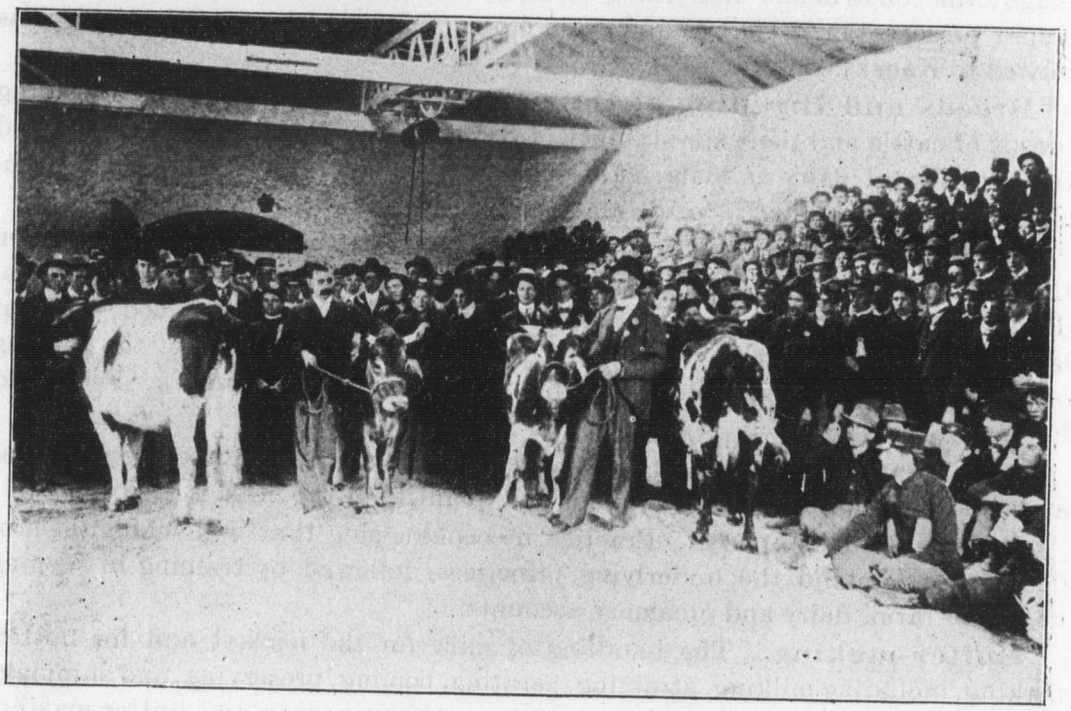
Testing. Practical work in sampling. The use of the Babcock test for milk and cream, skim-milk, and whey. The lactometer, Mann's acid test, Wisconsin curd test, Marshall rennet test.

Boiler and Engine Work. Lectures and practice in the firing of boilers, care and running engines, pumps, etc.; practice in shops.

Separators and Butter-making. For farm-dairy course, practice with hand separators: adjusting, operating and testing separators for efficiency. Private butter-making, ripening of cream, making starters.

Butter-making and Cheese-making. Thorough practice in creamery and cheese factory, receiving, separating, pasteurizing, ripening cream, making starters, churning, working and packing butter. Practice in Cheddar cheese-making for cheese-making.

Feeding and Care of Milk. Practice at dairy barn in making rations for dairy cows, feeding, keeping records of dairy herd, aerating and cooling of milk. Care of cows; saving and handling of manures.



JUDGING DAIRY CATTLE.

THE FARM DAIRY COURSE.

This course is intended for young men who are or expect to be managers of dairy farms, who for any reason cannot take the time required to complete our four-year course in agriculture. Instruction along the various lines is given with this thought in view. Our equipment is such that excellent training can be given in this line of work.

THE DAIRY MANUFACTURES COURSE.

It is the plan of this course to fit such young men as desire to follow creamery or cheese work for the best usefulness along these lines. Enough flexibility will be given the laboratory work to meet the requirements of all. Those who expect to operate skimming stations will need to put a greater part of their time on the receiving of milk, testing, separating, pasturizing and preparing cream for shipment.

Those who have had some experience and show proficiency in their work may put the greater part of their time in ripening of cream, the making of starters, and churning.

Those who take cheese-making will receive milk and take the work in testing the same as those in butter-making.

ADMISSION AND EXPENSES.

Same as Farmers' Short School Course. See page 7.

Each student taking dairy practice will be required to deposit five dollars with the secretary of the College, at the time he secures his assignment, to pay for any glassware he may lose or break, and the dairy department will keep an account of such losses. The difference between the amount of the deposit and the losses by breakage will be returned to the student at the close of the term. If any student breaks over five dollars' worth of glassware before the close of the term, the dairy department will report such student to the secretary of the College, who will require that he make an additional deposit.

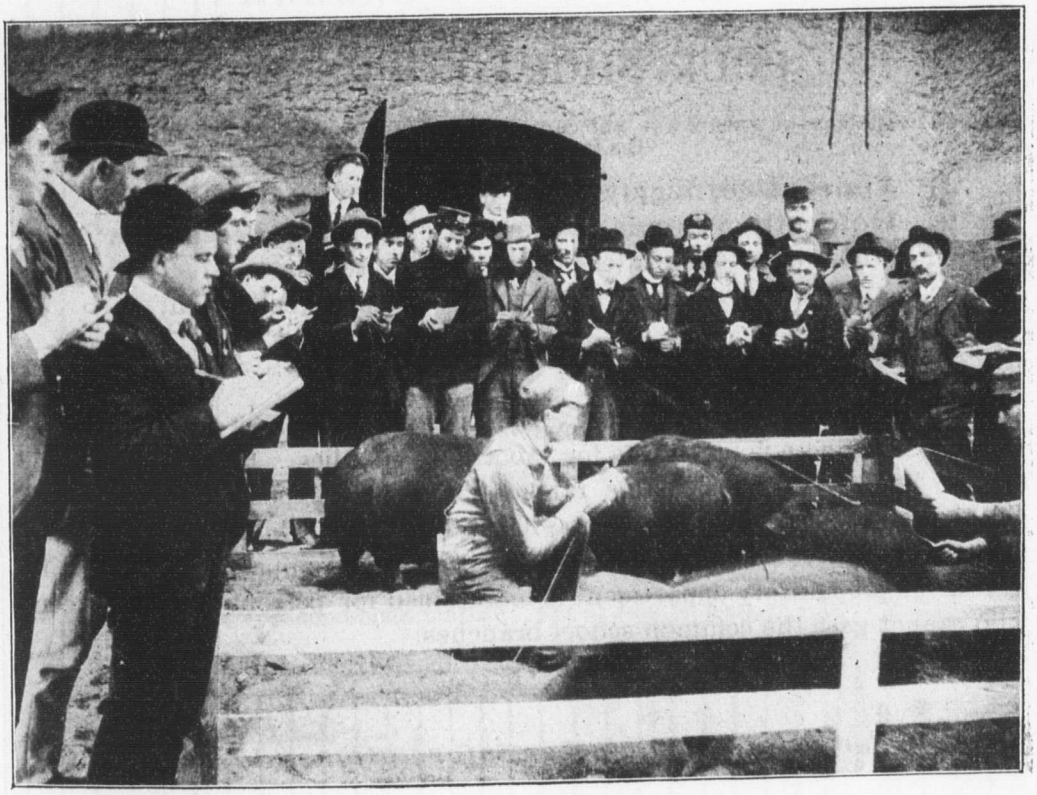
APPRENTICE WORK.

The college creamery is in operation throughout the year. We have arranged the work so that young men who wish to get the practical work of the creamery may enter at any time after the close of the dairy school and enroll as apprentices in dairying. No class-work will be required of such students. For young men who have had no previous experience this practical work offers an excellent preparation for the twelve-weeks dairy course. Not over twenty can be accommodated at one time. Students will be enrolled in order of their application.

SPECIAL SHORT COURSE.

Last year we offered a special ten-days course for men who were holding positions as butter-makers. The result was so satisfactory that the work will be offered again this year. The time will be the ten days following the state dairy convention. The work of this course is the studying of starters and flavors and ripening of cream. If there is any one thing more than another that our Kansas butter-makers and creamery managers are not well posted in it is the question of starters.

It is hoped that this special course will appeal to the creamery men of Kansas, and that they will encourage their butter-makers to come.



JUDGING HOGS.

VOLUME 29. NUMBER 8.

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THE INDUSTRIALIST.

VOL. 29. MANHATTAN, KAN., NOVEMBER 11, 1902. NO. 8

BRIEF HISTORY OF THE KANSAS STATE AGRICULTURAL COLLEGE.

THE bill endowing the agricultural colleges was signed by President Lincoln on July 2, 1862, and was entitled: "An act donating public lands to the several states and territories which may provide colleges for the benefit of agriculture and the mechanic arts." Section 1 apportions to each state and territory 30,000 acres of public land for each senator and representative in congress. Section 4 reads as follows: "And be it further enacted, that all moneys derived from the sale of the lands aforesaid by the states to which the lands are apportioned, and from the sale of land scrip hereinbefore provided, shall be invested in the stocks of the United States or of the state, or some other safe stocks, yielding not less than five per centum upon the par value of said stocks; and that the money so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished (except so far as may be provided in section 6 of this act), and the interest of which shall be inviolably appropriated by each state which may take and claim the benefit of this act to the endowment, support and maintenance of at least one college, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislature of the states may respectively perscribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."

The joint resolution of the legislature accepting the grant was approved by Governor Carney, February 3, 1863. The grant gave Kansas 90,000 acres, but as a portion of the selected tracts supposed to be within railroad limits counted double, the college received but 82,313.52 acres. This land has all been sold and results in a permanent endowment of about $500,000.

In March, 1887, congress passed the following bill: "An act to establish agricultural experiment stations in connection with the colleges in the several states under the provisions of an act approved July 2, 1862, and of the acts supplementary thereto." This donation was at once accepted by joint resolution of the legislature. This gave to each state and territory $15,000 annually for the purposes as set forth in section 2 of the act: "That it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and water; the chemical compositions of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches and experiments bearing directly upon the agricultural interests of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective states and territories."

A further bill was approved by President Harrison, August 30, 1890, the purposes of which are set forth in the title of the bill: "An act to apply a portion of the proceeds of the public lands to the more complete endowment and support of the colleges for the benefit of agriculture and the mechanic arts established under provisions of an act of congress approved July 2, 1862." Section 1 reads in part as follows: "There shall be, and hereby is, annually appropriated, . . . the sum of $15,000 for the year ending June 30, 1890, and an annual increase of the amount of such appropriation thereafter for ten years by an additional sum of $1000 over the preceding year and the annual amount to be paid thereafter to each state and territory shall be $25,000, to be applied only to instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematical,

physical, natural and economic sciences, with special reference to their applications in the industries of life, and to the facilities for such instruction."

Early in 1857 an association was formed to build a college in or near Manhattan, to be under the control of the M. E. church of Kansas, and to be called "Bluemont Central College." The charter was approved February 9, 1858. It provided for the establishment of a classical college, and also contained the following provision: "The said association shall have power and authority to establish, in addition to the literary department of arts and sciences, an agricultural department, with separate professors, to test soils, experiment in the raising of crops, the cultivation of trees, etc., upon a farm set apart for the purpose, so as to bring out to the utmost practical results the agricultural advantages of Kansas, especially the capabilities of the high prairie lands."

The leading members of the association were: Rev. Joseph Denison, D. D., afterwards president of the college; Isaac T. Goodnow, state superintendent of public instruction 1862–'66; S. C. Pomeroy, afterwards United States senator. A site of one hundred acres two miles northwest of the town was selected and the title secured by special act of Congress introduced by Senator Pomeroy. The corner-stone was laid May 10, 1859. The college had a hard struggle and when the act of July 2, 1862, was passed, and accepted by the legislature, the trustees offered it at once to the State. The offer consisting of one hundred acres of land, a plain three-story stone building, 44x60 feet, several hundred volumes, and some illustrative apparatus, valued at about $25,000, was accepted.

Mr. Denison was president of the college till 1873. At the end of his term there was a preparatory course of two years and four four-year courses—agriculture, mechanic arts, military science, and literary. The institution grew but slowly. The newness of the State, the civil war, the western location of Manhattan, the inadequacy of means, the little understanding of industrial education, all conspired to this end. Up to 1873 only fifteen students had graduated. The last catalogue issued by President Denison lists two hundred two students and gives a faculty of eight professors and four assistants.

To Rev. John A. Anderson, president from 1873–'79, belongs the

credit of making the college agricultural and industrial in its tendencies. In September, 1873, the Board of Regents adopted the following resolution for the purpose of defining their policy and as a guide to the faculty in preparing a new curriculum:

"*Resolved*, That the object of this institution is to impart a liberal and practical education to those who desire to qualify themselves for the actual practice of agriculture, the mechanic trades or industrial arts. Prominence shall be given agriculture and these arts in the proportion that they are severally followed in the State of Kansas. Prominence shall be given to the several branches of learning which relate to agriculture and the mechanic arts, according to the directness and value of their relation."

Three six-year courses of study were adopted—farmer's, mechanic's, and woman's. In 1877 the farmer's and mechanic's courses were united, and that with the woman's course reduced to four years. The number of graduates during President Anderson's term was thirty-four and the enrolment at the close of his term was two hundred seven.

Dr. Geo. T. Fairchild was president from 1879–1897. The farmer's and woman's courses were merged into one course differing in a few studies and in the industrial work as sex required. In the winter term of the second year young men had agriculture and young women household economy, and in the fall term of the fourth year young men had agriculture and young women had special hygiene. As under President Anderson, each student was required to take an industrial one hour each day or its equivalent. This course continued for eighteen years with but few changes and these changes in the entrance requirements mainly. During President Fairchild's term there were five hundred twenty nine graduates and the enrolment the last year was seven hundred thirty-four.

During Pres. Thomas E. Will's administration (1897–'99), four courses of study were offered—agriculture, mechanical engining, general science, and domestic science. A twelve weeks' course in dairying was established and an apprentice course of forty weeks in the shops and printing-office. The number of graduates during the two years was one hundred twenty-three and the number of students the last year eight hundred seventy.

At the beginning of the present administration (1899), the

four long courses of study were thoroughly revised and a course in electrical engineering added. These courses were all made alike the first year, except such differences as sex requires.

A term in agriculture was put in the first year, so that each young man might have one term of scientific agriculture before making a selection of a course. The increase in the number of young men taking the agricultural course fully confirms the wisdom of this arrangement. A short course in domestic science and a short course in agriculture were introduced. The length of each of these is two terms of twelve weeks, the domestic science being given in the fall term and the agriculture in the winter. The apprentice courses were increased to eighty weeks each and an apprentice course in dairying was added.

E. R. NICHOLS.

EVOLUTION OF THE AGRICULTURAL COURSE.

A COMMITTEE on entrance requirements and methods of teaching agriculture was appointed by the Association of American Agricultural Colleges and Experiment Stations in 1895. This committee reported the next year at the meeting held in Washington, and have added to the report each year since. The result of their deliberations in regard to a course of study in agriculture for a bachelor of science degree is given in the first column. The figures indicate class hours, the laboratory and industrial hours being counted as one-half. The remaining columns give the agricultural co .rse as it has been under the different administrations of this College—Denison (1863–'73), Anderson (1873–'79), Fairchild (1879–'97), Will (1897–'99), Nichols (1899–).

The elective industrials are not included in the table nor the required industrials if they are not strictly in line of the vocational studies. During President Fairchild's administration the young men had one term of carpentry, and during the last two administrations the young men have had one term each of carpentry, blacksmithing, and foundry work. These are all directly valuable to the farmer, as well as indirectly in giving manual skill and dexterity, and might very properly be included with the vocational studies helpful to agriculture.

AGRICULTURAL COURSE FOR BACHELOR'S DEGREE.

A. A. A. C. E. S.	1872	1877	1896	1898	1900
I. Culture Studies:					
Language—English 200	324	270	372	360	360
Modern 340	120	...	...	...	...
Social Studies:					
History 80	90	90	90	180	180
Political Economy 60	60	90	60	204	60
Civics 50	96	...	60	60	60
Ethics 40	36	...	...	...	...
Psychology 60	36	...	60	...	...
Logic	36	90	60	...	...
Art—Drawing 60	60	270	153	45	60
Mathematics:					
Arithmetic	...	180	...	...	...
Algebra 75	60	90	180	120	120
Geometry 40	120	90	150	120	120
Trigonometry 40	120	90	72	...	72
Totals 1045	1158	1260	1257	1089	1032
Per Cent 34	45	56	51	37	35
II. Pure Sciences:					
Physics 150	180	135	150	180	180
Chemistry 150	120	180	152	225	225
Botany 180	120	45	120	192	150
Zoölogy 120	60	90	60	84	75
Physiology 180	120	90	50	60	72
Geology 120	60	45	60	60	60
Meteorology 60	...	..	...	...	...
Astronomy	60	...	...	...	...
Entomology	60	45	60	60	60
Mineralogy	60	45	60	...	...
Geography	60	...	...	...	...
Bacteriology	...	...	...	60	63
Totals 960	900	675	812	921	885
Per Cent 32	35	30	33	31	29
III. Vocational Studies:					
Agriculture 486	300	180	150	480	570
Horticulture 180	120	90	90	252	240
Veterinary Science 180	60	...	60	144	156
Agricultural Chemistry 180	60	45	80	90	90
Totals 1026	540	315	380	966	1056
Per Cent 34	20	14	16	32	36

E. R. NICHOLS.

The output of the College creamery has dropped to about three hundred pounds per week, but during the last few days it has shown signs of the expected winter increase which always comes about November 1. Arrangements have also been made for handling cream from Hays amounting to about five cans per week.

The Manhattan Horticultural Society will meet in the Horticultural Hall of the College on Thursday, November 20, at 2:30 P.M. A good program has been provided and everybody is invited.

THE APPEAL TO HERCULES.

IN the contention with insect pests there is often too much of the spirit of the carter's appeal to Hercules, as narrated by Æsop. Methods that have the stamp of startling novelty, or promise much through the use of an untried principle, are likely to find favor where those of greater familiarity or simplicity beg without success for notice. When beset at last with insect plagues like those of Egypt, there is indeed much excuse for the attempt to bring extraordinary influence to bear. So many times, however, are our own careless practices responsible for the plague that the appeal to Hercules deserves to be met here, as it was in the fable, by the suggestion that we whip up the horses and put our own shoulders to the wheel.

Like other members of the great life family, insects are continually struggling for place. They meet foes of their own class. One must give way. They have also to contend with unfavorable conditions, and must maintain the thread of life for the continuation of the species often through most disastrous circumstances. To offset this, they are at other times placed under the best of conditions for rapid increase. Their foes are reduced, food is plenty, and man, because his immediate profit is not endangered, is careless of their presence. Now the pest makes up the loss of place through previous untoward conditions, and like weeds when cultivation is abandoned, soon has the field.

Thus do most insects have their periods of relative scarcity and abundance. The reasons for their occasional suppression are not always easily discovered, and when known are not necessarily matters under our control. They may be those of the season, unfavorable conditions of moisture or heat or drought or cold, at critical times in the insect's development. They may result from conditions favoring the growth and abundant multiplication of the animal or vegetable parasites of the pest, as in the fungous diseases of the chinch bug.

These alternations of abundance and scarcity of the insect foe follow, like wave and trough, and we are too likely to wait till the crest of the wave appears before we attempt to guard against its destructive force, where measures precautionary or preventive might have broken the wave long before it reached its height, or stopped it at its origin.

In times of the relative scarcity of the insect, then, we must

still bear in mind the necessity of preventing its undue increase, if in the long run we would come out winners. Measures of such purport, in the warfare against insects, are practically all of similar nature to those of established value in other phases of good farming. The best farm practice, made to include the continual oversight of insects possibly troublesome, will go much farther in their control than will the occasional raid upon them when they have become thoroughly established.

The comparatively recent methods of the wholesale destruction of insects by the scientific use of the spraying engine, for example, have met with very gratifying acceptance, especially at the hands of the gardener and fruit grower; and while the great value of such means, under intelligent application, is no longer a matter of debate, it should be understood that their use cannot in all cases make up for a failure to apply, earlier, certain simple and fundamental measures in the fight upon the tiny foe. Such methods, for want of a better name, we may group under the term *cultural methods* against insects. Most of these do not call for the use of special apparatus, and demand only incidentally the use of insecticides, yet such use is none the less to be sought whenever profitable. Especially do these methods call for foresight, for early application of preventive measures, directed always by a positive knowledge of the important phases of the life history of the pest under treatment.

The character and extent of the crops render necessary upon the farm an almost entire dependence upon such methods. Here the specific attack possible in garden or orchard is generally impracticable and our success will depend upon some broader application consistent with the more extensive cultural operations of the farmer. But with this necessary variation to suit the style of culture, the mode of utilizing these methods is largely the same, whether in the garden or orchard, or on the farm. The illustrations given in the following paragraphs are selected with the intent to show the frequent advantage of preventive practice over that which is remedial only, in some cases of difficult treatment.

In the garden.—The cabbage aphis or plant louse is an example of an insect to whose multiplication mistaken practice largely contributes. It is a well-known pest, and annually attracts much attention by its abundance and persistence. It commonly does not bring itself into notice until we are forced to attend to it by

its rapid work in destroying the vegetable which forms its chief food. Then to destroy it is a task requiring an expenditure of time and labor to an extent hardly warranted by the value of the crop. Now the life history of the pest furnishes us the cue to its treatment. Feeding not only on the cabbage, this species is carried along upon some other plants of the same family. The mustard, the shepherd's purse and other cresses will keep it, in good numbers, ready to shift to the cabbage when this crop is ready for it. It also thrives on the worthless heads and stumps left in the cabbage field after the profitable crop has been removed. Taken into the pit with the stock to be carried over winter, it comes out in spring in added numbers. It also winters in the egg state on the stumps, and may be found on the winter plants of the annual cresses already mentioned.

What, then, are the suggestions? First: Clean culture, preventing the growth of wild cresses of all sorts, as weeds in or near the garden, and thus limiting the growth of its food plants to those cultivated in the garden. Second: The immediate destruction by feeding, or otherwise, of the cabbage leaves and stumps left in the garden at the removal of the crop. Third: The disinfection of the heads in storage by the use of some insecticide, as carbon bisulphide.

Similar is the case of the native grasshoppers which annually, in some part of the state, prove destructive to growing crops. These insects will always show to the observing farmer a method or time of attack that will be far more successful than those usually chosen, when they are in the height of their abundance and destructive power.

Notice should be taken of the advantage given by certain farm practices to the increase of the insects, and these practices should be changed. The opportunity offered by the habit of the insects of laying their eggs in great numbers together, in favored places, should be seized as affording the readiest method of preventing the destructive abundance in the crops the next season. If in wheat or alfalfa, it will be better to sacrifice a small area by disking in winter the egg-infested places than to allow the hoppers undisturbed possession to menace the whole field next season. The common practice is to omit all preventive measures, and next year to appeal to Hercules, invoking the aid of a germ disease or

similar means of destroying the hosts in the height of their power. And the appeal is usually unsuccessful.

The Hessian fly is another insect that furnishes an illustration of my theme. The oft repeated advice, based upon the preventive practice of successful wheat growers, to defer wheat seeding as late as possible to prevent egg deposit, is by many still overlooked, or perhaps is not considered practical. Hence the annually recurring appeal to the entomologist for a means of destroying the insect when it is too late. I can furnish no more pertinent illustration of the ease of practical prevention than that which may be drawn from the statement of a wheat grower, just received:

"I send you sample of wheat [badly infested] taken from my field, sown September 19, about nine acres, all as badly infested as the sample. A rain on the night of the day named delayed further sowing until October 1, when ten acres more was sown. Further rain delayed completion till October 8, when the remainder of the field, fifty acres more, was seeded. I can find no fly or see any trace of infested plants in any part of the field except in the nine acres first sown. All volunteer wheat is badly infested."

It should not require many such examples as the above to determine a preventive practice in the case of the Hessian fly, and correspondence with wheat growers in Kansas confirms my belief that such practice is in most cases completely successful.

But the above illustrations should suffice to show that if we are to succeed in the warfare against insect pests, we must not wait till they are doing their worst and then depend on extraordinary measures. Knowledge and foresight are the requirements for success in this work.

E. A. POPENOE.

The local editor acknowledges the receipt of an invitation to attend the quarter-centennial of the University of Colorado, at Boulder, on November 13, 14, and 15, 1902. Like the Kansas State Agricultural College, that institution has had a remarkable growth during the past half dozen years. It now has thirteen large stone and brick buildings, three hundred seventy-five students in the preparatory, five hundred fifty in the university proper, and one hundred five professors, lecturers, and instructors.

THE INDUSTRIALIST.

Published weekly during the College year by the Printing Department of the

Kansas State Agricultural College.

Manhattan, Kansas.

PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

The College poultry has had an attack of the roup.

The painting of the dairy barn and silo tower is completed.

Professor McFarland went down to Olathe to cast his ballot.

Miss Carrie Griffin, a sister of Albert Griffin, visited College last Friday.

The carpenter-shop is building twelve large tables for the new reading-room of the library.

The junior-senior football game will come off next Saturday. Everybody get their lungs ready!

The Veterinary Department is apt to receive any day from fifty to one hundred letters asking for blackleg vaccine.

Professor McKeever addressed the Clay County Teachers' Association, at Morganville, last Saturday evening.

Senior student C. Dearborn is teaching some of the classes in machine drawing formerly taught by Assistant W. M. Sawdon.

The premium list for the College poultry show, to be held December 1 to 5, inclusive, will soon be issued by the Printing Department.

The Websters gave a special program last Saturday night and invited the ladies to visit them. The program was rich and interesting, winding up in an imitation Midway side-show.

Number two of the lecture course entertainment, a concert by the celebrated Colonial Ladies' Military Band, under the direction of Prof. D. W. Howard, will be given in the College chapel to-night.

We are in receipt of No. 4, Vol. I, of the *Ruskin Rays*, the monthly paper of Ruskin College, Trenton, Mo. The number contains two marked articles relating to ex-president T. E. Will, of this College, who is evidently now in his proper element.

Number three of the *Jayhawker* will be out in a few days. This issue is being printed partly in the College printing-office and partly in the office of the *Nationalist*. The next one will all be "home made." The Printing Department is one of the busy places of the institution. Last Saturday the force held out until twelve o'clock at night, and regretted that the approaching Sabbath compelled a cessation of work.

Professor Walters will deliver an address at the annual meeting of the Swiss-American society of northern Kansas, at Marysville, Saturday, November 15.

Professor Webster will attend the Missouri Dairy Association, at Columbia, Mo., on Wednesday and Thursday of this week. He is on the program for an address to the buttermakers.

We are in receipt of a separatum from the transactions of the American Mathematical Society, Vol. III, No. 4, on the "Algebraic Transformation of a Complex Variable Realized by Linkages," by Prof. A. Emch, formerly of this College.

S. R. Kimble, sergeant Troop J, Fourteenth United States Cavalry, writes to Professor Walters, from the School of Submarine Defense, at Fort Totten, N. Y., that he is getting along well in his studies and expects to take examination for second lieutenant within a short time.

Professor and Mrs. Metcalf, formerly of the Faculty of this College, visited chapel last Thursday morning and looked at the multitude from the rostrum. The professor responded to the calls of the students by giving them a short talk on the many evidences of growth which he said he noticed at every hand.

President Nichols made some short but impressive remarks last Wednesday morning in chapel, concerning the causes and results of the many failures at mid-term examination. He warned especially against the habit of many of the weaker students studying their lessons with stronger ones. He encouraged the getting of lessons after a time schedule and in the same order as the class work, and emphasized that self-reliance, will power, good order and a time-table would overcome all difficulties.

ALUMNI AND FORMER STUDENTS.

Mrs. Emma Knostman-Huse, '80, was elected president of the Fifth District Federation of Women's Clubs at its recent meeting in Clay Center.

H. C. Rushmore, '79, is now to be addressed at 2028 North Fifth street, Kansas City, Mo. He is manager of the Gille Hardware and Iron Company.

We have received the announcement of the wedding of Miss Mary J. Pincomb, '96, who was married Monday, the third of November, to Mr. B. Frank Moats. After the first of December, Mr. and Mrs. Moats will be at home in Tampico, Mexico.

The many friends of Prof. G. H. Failyer, '77, so long at the head of the Chemical Department here, will be glad to learn that his worth is appreciated in the bureau of soils, and that he is now permanently stationed at Washington, D. C., having been transferred from the field force to the chemical division. The change is accompanied by a very handsome increase in salary.

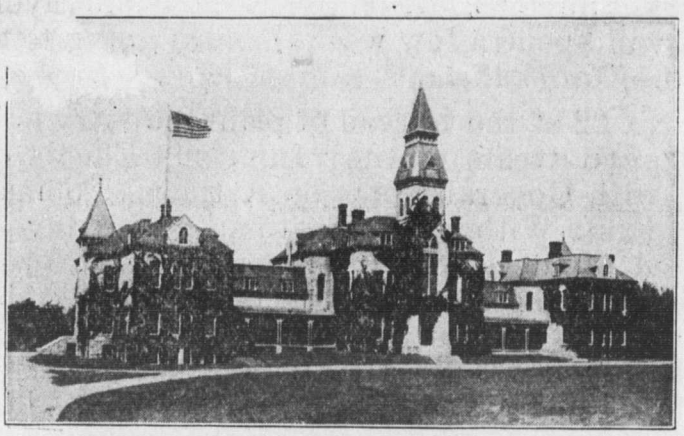
The wedding of Miss Edith L. Lantz ['96], daughter of Prof. and Mrs. D. E. Lantz, and James N. Simmons, of Victor, Colo., was solemnized last evening [November 5] at 7:30 at the home of the bride. About twenty friends and relatives witnessed the impressive ceremony performed by Rev. J. K. Miller. A dainty supper was served after the ceremony. The bride is a highly respected young woman, popular among a large circle of friends. Mr. and Mrs. Simmons left on the Rock Island flyer for Denver, where they will spend a few weeks before going to their home in Victor, Colo.—*Nationalist.*

Bulletin No. 22 of the bureau of plant industry is by Charles P. Hartley, '92, and treats of the "Injurious Effects of Premature Pollination, with General Notes on Artificial Pollination. and the Setting of Fruit Without Pollination." The investigation has demonstrated the decidedly injurious effects of premature pollination in several cases, and the fact is emphasized that in order to secure successful results in the production of hybrids and the setting of fruit, careful attention must be given to the time when the pollen is applied to the stigma. The results will be of service to investigators and to workers in plant breeding.

David G. Fairchild, '88, agricultural explorer for the department of agriculture, is the author of Bulletin No. 26 of the bureau of plant industry, "Spanish Almonds and their Introduction into America." This beautifully illustrated pamphlet discusses the Jordan almond, pointing out its superiority, and recommending it for cultivation in this country. Mr. Fairchild secured cions of the variety and sent them to the department. Mr. Fairchild is also the author of Bulletin No. 23 of this bureau, on "Berseem: The Great Forage and Soiling Plant of the Nile Valley." This plant resembles alfalfa to a certain extent, and occupies a very large place in Egyptian agriculture.

The following item from the Arizona *Republican*, published at Phoenix, speaks in high terms of Miss Jeanetta Zimmerman, class of '91: "Yesterday the citizens of Tempe and the many friends of the Tempe normal all over the valley were privileged to witness the realization of a hope long entertained by them when the young ladies of the school established themselves in the newly constructed Tempe normal dormitory. The cost of the building itself will exceed ten thousand five hundred dollars, and is modernly constructed in every detail. From the preceptress' office to the culinary department, the building, consisting of nearly thirty rooms and accommodating nearly fifty students, suggests the ideas of elegance and practicability in its arrangement, accommodations and furnishings. In no one thing has the territorial normal board been more successful than in their selection of a preceptress for the dormitory—Miss Jeanetta Zimmerman, of Moray, Kan. Miss Zimmerman comes to Tempe with the highest recommendations, and has already evidenced in a great measure during the past four weeks she has mingled with the normal students that her success in the work she has assumed will meet all that has been and can be hoped for."

KANSAS STATE AGRICULTURAL COLLEGE



ANDERSON HALL (There are twelve others).

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KANSAS STATE . . . .
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Local Editor, - - PROF. J. D. WALTERS
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THE INDUSTRIALIST.

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A PAGE OF MUCH-ABUSED HISTORY.

THE effect that poetry has upon the popular conception of history is marked; the more so when the subject-matter dealt with lies on the border-land between history and tradition. There the very mistiness and uncertainty with which such matter is surrounded lends an added charm which many of us are liable to confuse with certain proof. We do not usually like to be disenchanted. We desire to think of our "Aeneas" as having actually lived and performed the deeds ascribed to him. We learn with regret that the tales of "King Arthur and the Knights of the Round Table" have a very shadowy position in history. We prefer to believe that Barbara Frietchie did wave "Old Glory" in the face of Jackson's troops at Frederick, proof to the contrary, notwithstanding. Without doubt, the regard for historic accuracy is not so strong a trait in most of us as the poetic instinct. It is, therefore, with pleasure that we greet anything which savors both of romance and is nevertheless substantiated by facts.

When we began our study of United States history, we were treated to a very brief little chapter on those early visitors to the American continent, the Norsemen or Northmen. In the brilliant light of the Columbian and later discoveries which we encountered in the next few chapters, we perhaps lost sight of those shadowy heroes of the earlier centuries; and when, later on, we came to read Longfellow's "Skeleton in Armor" we had to get down our dusty old histories to find out who they were.

It was about 1838 that Longfellow made a brief visit to Newport, Rhode Island, and Fall River, Massachusetts. At the former place he saw the rather famous "Old Stone Mill," and on his return through the latter city took pains to see an armored skeleton which had been unearthed there. The result of this trip was the ballad (originally intended to be an epic), "The Skeleton in Armor." In connection with the poem, he says, "This ballad was suggested to me while riding on the seashore at Newport. A

year or two previous, a skeleton had been dug up at Fall River, clad in broken and corroded armor, and the idea occurred to me of connecting it with the Round Tower at Newport, generally known hitherto as the 'Old Windmill,' though now claimed by the Danes as the work of their ancestors."

For more than two years before the writing (December, 1840), even before the above mentioned trip, he had it in mind. In May, 1838, he writes in his journal, "I have been looking at the old Northern Sagas and thinking of a series of ballads or a romantic poem on the deeds of the first bold viking who crossed to this western world, with storm-spirits and devil-machinery under water. . . . This seems to be an introduction. I will dream more of this." He did; and, in one of his strongest and best productions, gave the dream to the world.

The term dream is a well chosen one. Yet, unstable as are the underlying data, the influence of this poem has been strong enough to make a decided impression upon the subject-matter of this little chapter in history as presented to us in our public schools. We have thus come to believe firmly that the Norsemen landed upon our shores during the eleventh century; that they even established fleeting settlements, leaving behind them definite traces which not only lasted over the interval of six hundred years to the period of the settlement of New England, but even appear to us to-day in the light of substantial relics. And this, in spite of the knowledge that in that earlier interval, generation after generation of Indians successively occupied this "Vinland" of the Norsemen. The principal archaeological traces advanced in support of a New England "Vinland" have been the "Dighton Rcck," in Dighton, Mass., the "Old Stone Mill," of Newport, Rhode Island, and the *Skeleton in Armor* dug up at Fall River in 1831.

True, there are certain reasons for believing that these hardy sea-rovers did find their way to the American coast. We have a great variety of well-established evidence that they founded a settlement in Greenland and built permanent structures, the ruins of which are still standing. It would be but a step farther, and an easy one for such adventurous spirits, to sail westward and southward and reach some portion of the continent between Labrador and Florida. The most important evidence to this effect is that of the "sagas" or early writings of the Icelanders.

These people, descendants of the Norsemen, had a flourishing literature in prose and verse as early as the twelfth century, *i. e.*, antedating the greater part of the European literature of the middle ages. Much of this literature is still extant. Considerable of it is matter of such sober and detailed character and tells its story in so straightforward a manner that we are justified in believing it to be fairly acceptable history. Moreover, where this deals with the voyages to "Vinland," it relates to matters which could scarcely have been the result of imagination. Hence, while we may well believe that these visits to America did take place, we have no tangible archaeological evidence.

Regarding the supposed relics of the Norsemen in this country, it would be of interest to sketch at length the appearance of the weather-beaten and tide-washed old rock, with its quaint hieroglyphics cut deeply into its smooth face; to discuss the interest which it has aroused in an historical way—from the opinion of George Washington, that it represented picture writings of the Indians, to that widely different one of Professor Rafn, of Copenhagen, Denmark, who ascribed it to the Norsemen, and even claimed to have translated a portion. This same learned professor connected the "Old Mill" of Newport with the Norsemen theory, pretending to detect a resemblance between its architecture and that of the old Norse style. However, all these things are to be found in books, including the more modern investigations which support Washington's view of the tracings on the rock and discover "The Mill" to have been built by an ancestor of Benedict Arnold for the rather prosaic purpose of grinding corn and not, as Longfellow makes the skeleton say:

> For my lady's bower
> Built I the lofty tower
> Which to this very hour,
> Stands looking seaward.

It is to be presumed that Longfellow did not know of the real and human tragedy which accompanied the discovery of the skeleton, else he had incorporated it in some of his remarks regarding the poem. It was the good fortune of the writer to happen upon the true history of this discovery a few years ago and to see and handle the only remaining relic of the *Skeleton in Armor*.

In 1831 the now prosperous manufacturing city of Fall River

was little more than an overgrown town. Such mills as it had were run by the water power of Fall river, a small stream which now flows under the city and empties into Mt. Hope bay, thence through Narragansett bay into the Atlantic. Somewhere along the banks of this little stream, in what is now the very business heart of the city, lived a family named Cooke. It consisted of father and mother and two or three children. One of the eldest of these, a boy, was very fond of playing in a sand-bank in the vicinity known as Mosquito Island. Playing here with a comrade on one fateful day, a great mass of sand, crumbling from above, caved in upon them. The playmate, by some good fortune, extricated himself. Frightened by what he had witnessed, and perhaps fearing punishment for some vaguely imagined responsibility, hid himself under a neighboring barn. When found, it took considerable time to get from him the details of the accident. When at last it began to be realized by the two families that a tragedy had occurred, they hastened to the spot, and the mother, too grief-stricken to await slower but more certain means, began to dig frantically in the fallen sand. Suddenly she encountered something hard, and seizing upon it, pulled from the loose sand the skeleton of an adult, encased in corroded helmet and armor with three strings of metallic pieces of piping about the waist.

In the excitement of the recovery of the dead child and its succeeding burial, the skeleton was forgotten. It lay upon the sand-bank for some days until, the story of the tragedy being repeated, the mention of an armored skeleton attracted the attention of some local collectors, who secured permission to place it in what was known as the "Athenaeum," a museum of local historical collections. Here Longfellow saw it; and here, in 1843, it was destroyed in the fire which consumed the principal portion of the city. Before the skeleton was taken to the museum, however, the several pieces of piping had become broken apart and the pieces of brass were distributed to the children for playthings. My informant, the sister of the unfortunate boy, said that although she was not born until some years after the fatality, she could remember as a child seeing these pieces of tubing about the house. One day Mr. Cooke desired a ferrule to use in the repair of a small screw-driver, and picking up one of these tubes cut off a small portion about one-half inch in length and fastened it upon the handle of the tool. As the years went by

and changes came to the family the tubing became lost, all except this one small ring of brass upon the little old screw-driver. To-day this is the only existing relic of the *Skeleton in Armor*.

And now even the glamour of that cloak of tradition lent by the poet is removed, for it is no longer believed that this was a Norse viking who

> Joining the corsair's crew
> O'er the dark sea . . . flew
> With the marauders,

but that it was only the remains of some poor redman who had acquired portions of armor of some early English settler and, dying, had been buried in it. Indeed, nothing had been believed to the contrary until someone wrote to a historical society in Denmark of Longfellow's fanciful poem. Unfortunately, there it was taken seriously and enlisted as an argument for the priority of the Norse discovery of America to that of Columbus. Following upon this it was laid hold upon by popular and over-enthusiastic writers of history in this country and has passed to us as one of the indubitable proofs of a pre-Columbian discovery.

However, this old Norse warrior will as truly continue to live in poetry as though all that has been attributed to him were authenticated history.

> 'Thus seamed with many scars,
> Bursting these prison bars,
> Up to its native stars
> My soul ascended!
> There from the flowing bowl
> Deep drinks the warrior's soul,
> Skoal! to the Northland! Skoal!'
> Thus the tale ended.

LESLIE F. PAULL.

The thirty-fifth annual meeting of the Kansas Academy of Science will be held in the city of Topeka, Wednesday, Thursday, and Friday, December 31 and January 1 and 2, 1902–'03. Railroads will sell round-trip tickets to Topeka at holiday rates. Titles of papers to be read at this meeting should be in the hands of the secretary by December 1, at the latest, in order that the program may be arranged and printed. It is hoped that the members will respond promptly to this invitation, and that a full and interesting program may be presented.

THE INTERNATIONAL PLANT BREEDING CONFERENCE.

IN July, 1901, the Horticultural Society of New York began to lay plans for the assembling in New York City during 1902 of an international conference of plant breeders and hybridizers. Letters were sent out over the signature of Dr. N. L. Britton, director of the New York Botanical Garden, to all persons known to be interested in these subjects, inviting suggestions as to the feasibility of carrying out the plan and to secure agreement as to date of meeting, etc. As a result of this correspondence, the session of the congress was announced for September 30 to October 3, inclusive. The significance of such a conference, provided a full attendance could be secured, was sufficiently manifest to those interested in plant breeding, and the program of fifty-one papers, as announced, contained names sufficiently prominent and topics sufficiently interesting to make all those who had thought of attending still more desirous of being present.

When we finally found ourselves together in the hall of the American Institute in New York on the morning of September 30, we made several individual discoveries. We found not only that there were more people in attendance and from greater distances than we had scarcely dared hope for; that the nominal program was to be to an unusual degree, perhaps, a real program, but that we actually had enough foreign visitors to make the conference in a sense international, although the outsiders were all of our kinsfolk, the English.

We would gladly have had de Vries from Holland, Correns from Germany, Tschermak from Austria, and Vilmorin from France, since all these are names at the fore front of modern investigation and research in plant breeding and hybridization. But continental people are not such travelers as the English and do not so readily accustom themselves to transatlantic journeys. If we lacked the presence of these men, however, we at least had the inspiration of messages of good will and interest in the proceedings of the conference from some of them, and from others not mentioned as well.

At all events we were most fortunate in the presence of those foreign plant breeders who found it possible to come. Dr. Saunders, of Canada, veteran and pioneer in agricultural investigation in that country and probably the oldest and most experienced cereal breeder in North America, came with several associates.

From Jamaica came Mr. Fawcett, director of the botanical garden, and Dr. Morris, British imperial commissioner of agriculture for the West Indies, whose work in the improvement of the sugar-cane has made his name well known through the tropics.

Perhaps the foremost figure in the congress, and the one whose address most profoundly affected the ideas and conceptions of those present, would, by general consent of all members of the conference, be conceded to be that of Dr. W. Bateson, of Cambridge University, England. Bateson's name has been associated in recent years with investigations upon the phenomena of hybridization along lines indicated by the Mendelian law of inheritance in hybrids, and he may, perhaps, by virtue of his trenchant, masterful English style and his combative energy, be accorded the same relation to Mendel that Huxley held to Darwin. Perhaps not ten persons in attendance at the conference had ever heard of Mendel or Mendel's law before they listened to Bateson's address at the opening session, on the morning of September 30. This is not in the least surprising, when it is recalled that from 1865 to 1900 the work of Gregor Mendel lay dead and buried in the little obscure journal of a scientific society of Brünn, Germany. In 1900, first de Vries, then Correns and Tschermak, made him known to the scientific world, and Bateson of England stands to-day foremost among his champions in the English-speaking communities. This full and impressive presentation at the first meeting of the conference, of Mendel's law of dissociation in hybrids, influenced the minds of the hearers profoundly and will be productive of wide-spread results.

Among the prominent and active workers in plant breeding in America who were present and represented on the program one must at least mention Professor Bailey, of Cornell, beloved of all who have come in contact with his charming personality. With rare drollery he told in his pungent style his experiences in crossing myriads of pumpkins. It is characteristic of Professor Bailey to give his audiences pleasure and not to burden them with wearisome histories; but even the wit and gaiety of his remarks on "A Medley of Pumpkins" did not blind us to the fact that in this droll tale we had a summary of long years of patient laborious, painstaking work, with less humor in the doing than in the telling about it. From Minnesota came Prof. W. M. Hays, the best known and probably the most practically successful cereal

breeder in the United States, who has done remarkable work in the improvement of Minnesota spring wheat. From still more distant Texas came Mr. T. V. Munson, whose name is known the country over as our greatest breeder and hybridizer of the grape. Although further detailed reference to individuals is impossible, one may at least mention another breeder of plants whose services in introducing into the northwest the apples of Siberia and northern Russia have been of inestimable benefit to the people of that region, Prof. N. E. Hansen, of the Agricultural College of South Dakota, the first agricultural explorer to be sent abroad by the United States government.

One interesting fact in connection with the conference was the presence of so many representatives from the experiment stations, including, in many cases, several from a single station. And it was further striking that the western experiment stations were far better represented than were those of the east. The United States department of agriculture sent eight of its men, and besides the scientific men and "professors" who were naturally expected to be on hand one was gratified to see the large representation from the ranks of the practical growers of plants on a commercial scale. We had with us commercial specialists in gladioli, carnations, strawberries, roses, sugar-cane, grapes, wheat, and very many other plants which are marketable for one purpose or another. The accounts of their experiments by these men, conducted as they are in most cases on a larger scale than are those of an experiment station, since each grower is interested in raising large numbers of one particular kind of plant, were of the greatest interest and value to the scientific members of the conference, whose greatest desire and need is for well-authenticated facts to throw light on theories of heredity and variation.

After three days of faithful attendance the members of the conference met for their last session, on invitation of Doctor Britton, at the splendid botanical garden of the city of New York, on the Bronx, where a delightful luncheon was followed by papers and by complimentary addresses on the part of foreign members of the congress. A vote of thanks was tendered the New York Horticultural Society for its courtesies and favors, among which one would go wrong in omitting to mention the absolutely faultless and model chairman it furnished us in the dignified person of Mr. James T. Wood, of Herkimer, New York. On the following morn-

ing members of the conference became the guests of the Horticultural Society for a steamer trip up the beautiful Hudson to Poughkeepsie, where several of the New York country estates were visited. A most attractive and delightful luncheon was served at the summer residence of Mr. Newbold, treasurer of the society.

This was the end of the second international conference for plant breeding and hybridization, declared by those who had attended the first one, in London, a few years ago, to have exceeded it in numbers in attendance, in scientific interest and in the significance of the results attained. It is to be hoped that the third conference of this nature may in like measure exceed this one, the memory of which will linger long in the minds of those so fortunate as to have attended it. H. F. ROBERTS.

DR. ROBERT C. KEDZIE.

Died, Friday, November 7, 1902, at 9 P. M., Dr. Robert C. Kedzie, LL. D., in his eightieth year. Professor of chemistry in the Michigan Agricultural College since January, 1863. Chemist of the Experiment Station from its beginning. Funeral services at the College, Monday, 1:30 P. M.

Such is the simple summary sent out by the Michigan Experiment Station. Dr. Kedzie was a man of national force and reputation, and his interest in this institution was exceeded by few outside the State. His oldest son, Wm. K. Kedzie, planned the old chemical laboratory here, and was practically the founder of the Chemical Department. He married Miss Ella Gale, '76, daughter of Prof. E. Gale, who filled the chair of horticulture here for many years. His second son, Robert F. Kedzie, taught in his brother's place for a year while the latter was on a leave of absence, and later married Miss Nellie Sawyer, '76, through whom the Domestic Science Department of the College was destined to become of enviable renown in the State and the country at large. His wife was a sister of the late Pres. George T. Fairchild. Since her death some years ago, his daughter-in-law, Ella Gale-Kedzie, '76, has made her home with him, her husband having been dead for many years.

By all these relationships and associations this institution was bound to Doctor Kedzie's affections with a strength that seldom occurs, and his direct and indirect influence upon it has been very great. His death will bring sorrow to many hearts outside

his immediate family. Doctor Kedzie was a man of strong convictions, rugged and clear intellect, undaunted courage, inflexible will, but withal of a sympathetic heart that endeared him to those with whom he came in contact. He has been a dominant force in the Michigan Agricultural College throughout almost its entire history. He retained his vigor of mind and his interest in current affairs to the very last. The establishment of the beet-sugar industry in his state is largely due to his efforts in recent years. Not until the last year would he give up the active work of teaching and directing the chemical department, but he finally accepted the title "Professor of Chemistry, *Emeritus.*" A good and great man has gone, and we shall not see his like again soon.

J. T. WILLARD.

Come one, come all to the poultry show! Arrangements are being made to hold a great poultry show at the Agricultural College, December 1 to 5. The entry fee will be twenty-five cents for competition and ten cents for exhibition only. All birds will be entitled to score cards. The special premiums will amount to over $500. There will be at least twelve $10 specials and about twenty $5 specials, besides other special premiums. The exhibition will be held in the stock arena of the College, one hundred by forty feet, which is well heated and well lighted. The College will furnish feed and attendants without expense to the exhibitor. A large exhibit is expected, and it will undoubtedly be one of the large shows of the State this season. Prof. D. H. Otis is president, B. W. Smith vice-president, and W. A. Lamb secretary. C. H. Rhodes will be the judge. Professor Otis and his assistants are taking an active interest in making this exhibition a great success. Send for premium list.

The next meeting of the American Association for the Advancement of Science will be held at Washington, D. C., December 29 to January 3. This is the first time the association has arranged for a winter meeting, and it is hoped that the attendance will be as good or better than those of the summer meetings. The association has over three thousand members in good standing. Professors Willard and Walters are members from this College.

THE INDUSTRIALIST.

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PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

Applications for farmers' institutes are coming in from all parts of the State.

Doctor Mayo is giving the first years a series of lectures on "First Aids to the Injured."

The radiators and the carpets for the new reading-room of the library have arrived and will soon be in place.

President Nichols is working on the schedule of studies for next winter term, a task almost as complex and difficult as a modern war plan.

Prof. W. A. McKeever addressed a convention of the school district boards of Brown county, at Hiawatha, Saturday evening, November 15.

The senior-junior football game came off November 15, on the drill ground of the campus. The juniors carried off the honors two to nothing.

The sophomore social last Monday night, in the girls' Gymnasium, was a happy and well-attended party, as all sophomore gatherings are.

The door to the fire-proof vault in Physical Science Hall has been put in place. This vault will furnish a safe place for records and specially valuable apparatus.

Mr. Billings, representative-elect from Marion county, and Mr. W. H. Evans, real estate agent, Marion, were shown about the College Friday forenoon by President Nichols.

The Jensen Manufacturing Company, of Topeka, sent the Dairy Department an outfit consisting of a milk heater, a pasteurizer, and a cream cooler. These are to be used in the dairy school work.

The carpenters have commenced the putting up of the feed and manure car tracks in the new dairy stable. The building will require about five hundred feet of overhead steel tracks for the easy handling of the feeds and manure.

The Chemical Department has received a shipment of chemicals imported from Germany. Most of them are to replenish stock, but there are a few that are additions to the illustrative material, among them metallic lithium, calcium and maganese.

Number 3 of volume I of the *Jayhawker* is out—a handsome illustrated pamphlet of forty pages and chock-full of good things interesting to present and former students.

T. C. Weber, former assistant chemist in the Experiment Station, has begun his work in the bureau of chemistry of the department of agriculture, in Washington, D. C.

Ex-Regent Wm. Phipps was a welcome visitor at the College Thursday, November 13. Mr. Phipps is still connected with the Blue Valley Creamery Association. He told us that his headquarters had lately been shifted from St. Joseph, Mo., to Junction City, Kan., and that it would have been placed at Manhattan had he been able to rent a house here.

Twenty-five club ladies from Clay Center visited College Thursday afternoon, from 1:30 to 3:30, then attended a meeting of the Domestic Science Club in the city. They were shown about College by members of the home club and entertained at tea. The evening was spent at the home of President and Mrs. Nichols till train time. All were well pleased and greatly surprised at the magnitude and work of the College.

In a correspondence to *Science*, concerning the inauguration of Chancellor Frank Strong, Prof. E. H. S. Bailey, of the University of Kansas, got things somewhat mixed. He speaks of "Pres. P. B. Nichols, of Colorado Agricultural College," and of "President Nichols, of the University of Colorado," while he leaves out all mention of Pres. E. R. Nichols of the Kansas State Agricultural College. The fact is, the first man does not exist at all, the second is not a president but a professor, and the third is the one who gave the toast at the banquet.

Bulletin No. 114 of the Experiment Station has been mailed this week. The pamphlet was prepared last summer by Prof. H. M. Cottrell and is the last one prepared by him at this College. The professor concludes his experiments with the following practical suggestions: "This bulletin completes the work of the writer for the Kansas Experiment Station, and he leaves to take up work in another state. The writer has lived twenty-one years in Kansas, and during this time has made a careful study of crop-production and of stock-feeding under all our conditions of soil and climate and changes in seasons. As a result of this study, he would urge on every farmer in the State to raise more alfalfa. Alfalfa sold or fed will return a greater net cash income per acre, year by year, than any other field crop. Land seeded to alfalfa will rent for more than for any other purpose. Large landowners can secure a greater cash income from their investments by seeding their land to alfalfa before leasing it than in any other way, and the land will constantly increase in fertility and improve in condition so long as the alfalfa is allowed to remain, while, with ordinary systems of cropping, rented land tends to constantly depreciate in fertility, condition, and value. The Kansas farmer needs to raise more alfalfa for his land's sake. Alfalfa gives him

heavy yields secured from soil many feet below that reached by other crops, and leaves the surface-soil richer, in better tilth, and ready to yield much more abundantly when planted to other crops. Alfalfa is an absolute necessity in Kansas for the cheapest production of beef, pork, mutton, and milk, and for securing the cheapest rapid growth of colts, young cattle, sheep, and pigs. It can profitably form the greater part of the feed of mature horses, cattle, sheep, and swine that are kept for breeding purposes, and is a cheap and good feed for poultry. It supplies the food elements lacking in most of our other field plants, and, when fed with them, makes a balanced ration. A thorough effort should be made by every Kansas farmer to grow it if he does not already have it on his farm. Alfalfa is of such great value as a feed, and its yield is so high, and it yields well for so long a period after a good stand is secured, that it will pay the Kansas farmer who is without it to carefully study every requirement of the plant, and then attempt to secure these conditions, and seed largely. If the first attempt fails, try again and again, if necessary, and final success will well repay for all expenditure. To the Kansas farmer who already has alfalfa, we would say, *raise more.*"

ALUMNI AND FORMER STUDENTS.

Born: On November 15, 1902, to Mr. and Mrs. Emil Pfuetze, a son. Mr. Pfuetze is a member of the class of 1890.

We are in receipt of a circular announcing the inauguration next winter of a short course in domestic economy at Oklahoma Agricultural College, to be in charge of Miss Maud Gardiner, '93.

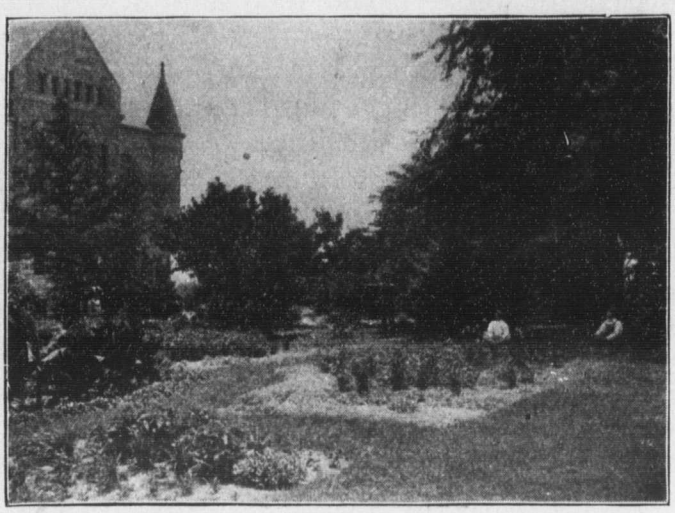
The friends of Orville Stingley, '96, announce that he will be married to Miss Leone Freeman, of Kansas City, Mo., on Thanksgiving eve, November 26, at the home of the bride.—*Mercury.*

Among recent visitors from the alumni were Dr. A. L. Peter, '97, now a prosperous physician in Colorado, and W. H. Phipps, '95, whose genial personalty is still winning profits for the Blue Valley Creamery Company.

J. E. Payne, '87, visited College recently, more especially to consult Professor Lantz in respect to prairie-dog extermination. Mr. Payne is a member of the staff of the Colorado Experiment Station, and is especially in charge of studying and improving the agriculture of the great plains. He has been working in this field for seven years, and is probably the best equipped man in the country on this subject.

Mr. W. E. Mathewson, '01, has completed a three months' appointment as expert in the bureau of chemistry, United States department of agriculture, in studying the manufacture of table syrup from sorghum. Mr. Coover at a late date having declined the appointment as assistant in chemistry here, the Chemical Department is quite fortunate in persuading Mr. Mathewson to return to his old position, and postpone the study of medicine.

KANSAS STATE AGRICULTURAL COLLEGE



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THE INDUSTRIALIST.

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EXPERIMENTS WITH THE ALTERNATING CURRENT INCLOSED SERIES ARC LAMPS.

COMPANIES who use the alternating current inclosed series arc lamp have met with two difficulties, which seem to be the obstacles which prevent this method of arc lighting from being a complete success. They are as follows: (1) The proper regulation of the air supply to the arc. (2) Perfect insulation.

It has been found by those who have made a study of the alternating current arc light, especially from the practical point of view, that the amount of air supplied to the arc is of vital importance. Even with the proper voltage drop over the lamp and the normal current through the arc, the lamp may or may not give the proper candle power. If the air supply is too small, a very low candle power is obtained; and, again, if the air supply is too great, the the candle power is decreased.

The gases in the arc globe are said to be of an explosive nature and by sealing the globes air-tight it is possible to cause them to explode after the lamp has burned continuously for some time. The air supply has also a peculiar effect upon the carbons, causing them to become hard and glazed, and the length of arc decreases below its normal length if air supply is insufficient. This question of air supply will afford those interested in this line of work a large field for investigation, as well as considerable food for reflection.

The difficulty with the insulation is caused by the high electro-motive force produced by the alternating current over the terminals of the lamp when the lamps are thrown in circuit with the generator. The cause of this high electro-motive force is probably as follows: When the voltage is impressed upon the line, the carbons are separated and the instantaneous rush of current is through the shunt coil. This shunt coil, being wound inductively, has a high electro-motive force induced in it just for an instant, *i. e.*, until the arc circuit is closed. This electro-motive

force is high enough to soon cause a puncture in the insulation. The effect of the weather, also, has the tendency to decrease the insulating value of the insulation in the lamps. The effect of unfavorable weather also decreases the life of the carbons about twenty-five to thirty per cent. By paying special attention to the method of insulating the lamp and by proper arrangement of the series leads the per cent outage for a period of six months has been decreased from five per cent to about one third of one per cent, the later results being much better than is ordinarily secured by the best direct current arc lamps.

In determining the regulation of the inclosed alternating arc-lighting circuit, the pressure and wattage were taken over a single lamp with twelve lamps and the Manhattan Regulator in circuit. The line pressure was maintained constant at ten hundred ninety volts, with a frequency of sixty cycles. The line current, the drop over the single lamp terminals and the power consumed by it were recorded each thirty seconds for one hundred fifty consecutive readings. The average line current during the test was 5.92 amperes. The highest reading during this time was 6.2 amperes; the lowest, 5.5 amperes; giving an extreme variation of 0.7 amperes. The greatest variation of any single current reading from the mean of one hundred fifty readings was 7.09 per cent below the mean average, and 4.7 per cent above it.

When the line voltage falls considerably below the average operating voltage of the lamps, the "flashing" of the arcs and the "pumping" of the regulator in consequence give poor regulation. It was found that with a full load, twelve lamps, in circuit it was necessary to maintain a voltage of about seventy volts, or the arcs would "flash." This, however, depended somewhat upon the cyclic speed, as will be shown later. At normal frequency, sixty cycles, fourteen lamps were thrown into the circuit and the voltage lowered until the potential would not continuously maintain the arc. The lowest voltage under which they would successfully operate was seventy-seven volts. There was under this condition a noticeable diminution in the candle power and a violent flashing when the lamps were first thrown in. With thirteen lamps in curcuit, the same pressure was required. When eleven and twelve lamps were in circuit, a higher pressure was required to give satisfactory results for continuous operation.

The current regulation for full load is shown by the curve of

lamp regulation to be good. The voltage curve for lamp regulation, with a frequency of sixty cycles, shows a rise with the time of operation. When these lamps are operated for periods of twelve to twenty hours with an improperly regulated air supply, the arc changes in aspect and luminous efficiency. The same length of arc is not maintained and the globes are frequently broken. The manufacturers recognize this difficulty, and have endeavored to regulate the air supply.

The product of combustion that is most in evidence is carbon monoxide. The pressure of the gases of combustion appears to increase the resistance between the carbons and it is probably largely due to this cause that the ordinates of the voltage curve increase with the time of operation. When a free-air circulation is provided, the continuous rise of voltage is not evident, and it remains fairly constant.

The average efficiency of the alternating current series inclosed arc is taken, as shown in the data sheet, by measuring the wattage consumed in the arc and that in the entire lamp and taking the ratio of the two is found to be 94.3 per cent. The power consumed in the shunt coil was 14.74 watts. The average power consumed by the arc proper was two hundred forty-five watts. The per cent efficiency with six lamps in circuit was greater than when operating under full load. The average pressure over the arc during the time that the above determinations were made was 71.1 volts.

Similar measurements were made over the direct current constant potential enclosed arc. The average pressure over the direct current arc was eighty volts, with a terminal line pressure of one hundred ten volts. The drop over the regulating mechanism was thirty volts. The average current during the test was 4.7 amperes. The power consumed in the arc proper was three hundred eighty-five watts, and in the regulating mechanism one hundred forty-four watts, giving an efficiency of 73 per cent. The lower efficiency of the direct current arc may be accounted for in the larger loss due to the ohmic resistance in the regulating mechanism as compared with the smaller loss in the reactance coils of the alternating current arc lamp, due to the wattless component in the latter. The average current consumed in the direct current arc was 4.7 amperes. The extreme variations were 7.4 per cent below and 23.8 per cent above the mean read-

ing. In so far as regulation alone is concerned, taking the average throughout, and its deviation from the normal current value, the alternating arc is quite as well regulated as the direct current arc.

With all measurements taken over the arc proper, the power factor of a single arc, when twelve lamps were in circuit, was considerably less than unity. This leads to the conclusion that the current and electro-motive force over the arc are not in phase and that the arc acts as an inductance and offers a counter-electro-motive force to the passage of the current.

Mrs. H. Ayrton concludes, however, after an extensive investigation of the electric arc, that it is not necessary to assume a large counter-electro-motive force, nor "negative" resistance, in the arc gap, but that the laws of resistance, when applied to the existing conditions, are quite sufficient to account for the phenomena connected therewith.

It is shown that the volatilized portions of the carbon, when once the carbons are separated, does not retain the same temperature, the air cooling portions of it into a carbon "mist;" that the positive pole, only, volatilizes, and that the arc consists of (1) carbon vapor in the form of a thin layer, which comes from the positive pole, (2) a bulb of carbon mist that connects the vapor to the negative carbon, (3) a sheath of burning gases formed by the burning mist and the hot carbon ends.

The vapor in arc images appears as the gap like portion between the arc and the positive carbon, the mist as a purple bulb, and the gas as a green flame. The flame is shown to be of an insulating nature, so that the major portion of the current passes through the vapor and mist alone. Just here it is pointed out that the high resistance of the vapor, as compared with that of the mist, and not a counter-electro-motive force, causes the high temperature of the crater.

The action of cored carbons is also considered in Mrs. Ayrton's experiments. The effect of a core in the positive or negative carbon is shown to depend upon the current, the greater the current the greater will be the volatilization. More carbon surface will be covered by the volatile products and the resistance of the mist and vapor correspondingly less reduced.

It is shown, also, that this will account for the fact that, with a constant length of arc, the potential difference decreases as the current increases. When both carbons are solid, it frequently

remains constant, even when the current changes widely. When the positive carbon is cored, all vapor and mist must come from the cored carbon. When the negative is cored, they come from the uncored, and it is only because the metallic salts in the core have a lower temperature of volatilization than the carbon that the mist is able to volatilize these and thus lower its own specific resistance.

An attempt was made to determine the relation of voltage and frequency to the number of lamps in the circuit and the resulting regulation. The circuit was first operated with a constant line voltage and varying frequency, and then with varying line voltage and constant frequency. When frequencies ranging from fifty-two to sixty cycles were employed, fourteen lamps could be thrown into circuit without flashing out or seriously impairing regulation, while with a frequency of sixty-five cycles the limit was twelve lamps. Eleven lamps only could be operated when the frequency was increased to seventy cycles.

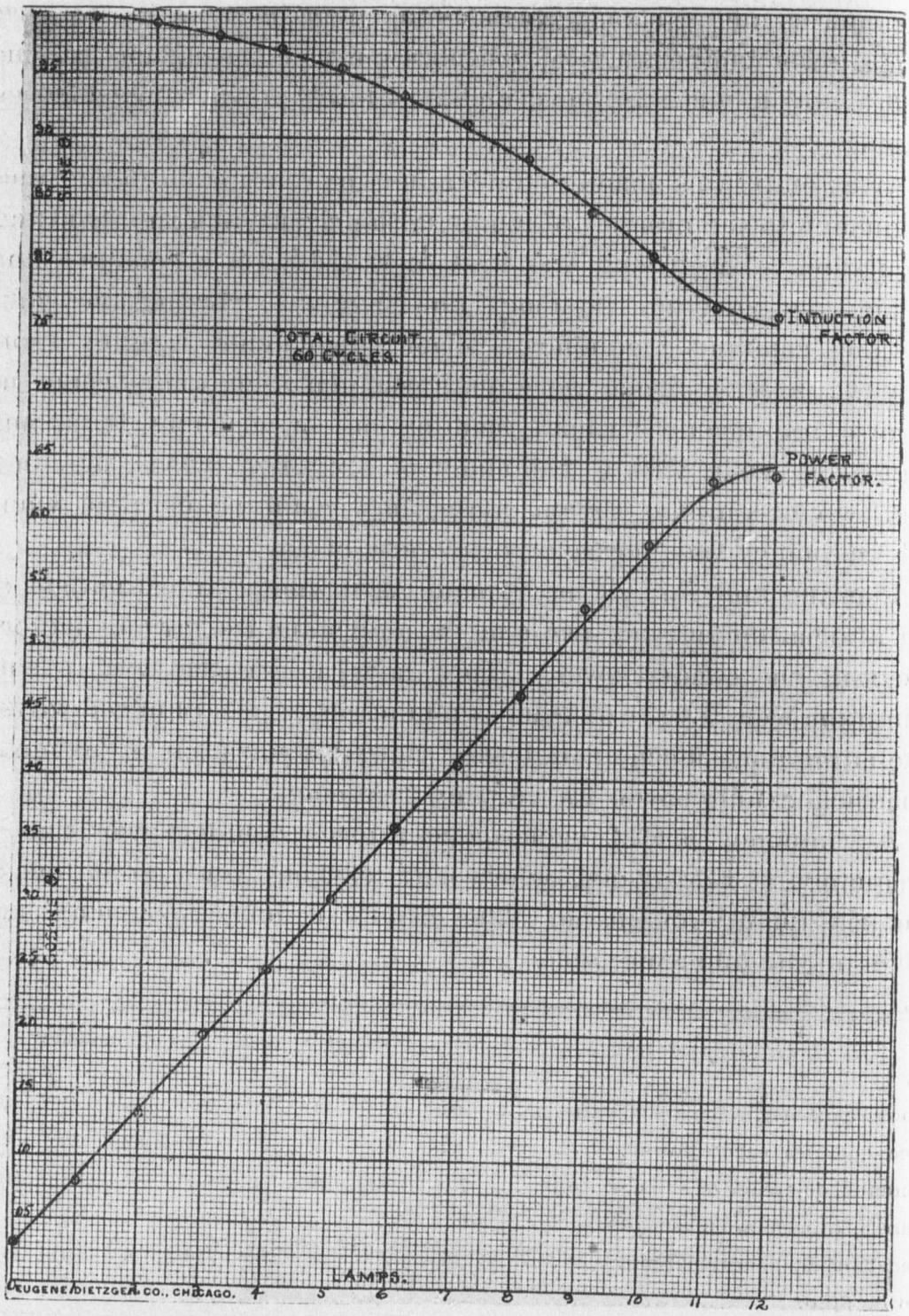
Fleming and Petavel have made an extended investigation of the alternating current arc lamp to determine the various factors affecting the candle power. They have shown that with a consumption over the arc of from two hundred to six hundred watts, excluding lamp mechanism losses, there is a variation of the mean spherical candle power for varying frequency.

A frequency of 83.3 cycles gave a lower candle power than a frequency of fifty cycles, where both carbons were cored and of the best quality obtainable. The results of their experiments are given in the following table:

	Frequency 83.3					Frequency 50.		
Power expended in the arc in watts.....	601	501	404	305	233	596	459	308
Mean spherical candle power..... ..	307	274	256	250	144	326	322	254
Potential difference of carbons—volts.....	37.5	34	28	21	15.3	39	31	22
Current through arc in amperes	16.2	15.1	15.1	15.5	15.4	16	15.1	14.6
Length of arc in centimeters.....	.628	.....	.125	.016	.01	.07	.....	.....
Power factor.....	....	. ....	.96	.96	.99	.97	.99	.97

From this it appears that for the same expenditure of power over the arc, a frequency of fifty cycles gives a mean spherical candle power six per cent greater than when 83.3 cycles are impressed. The length of arc maintained for the lower cyclic speed

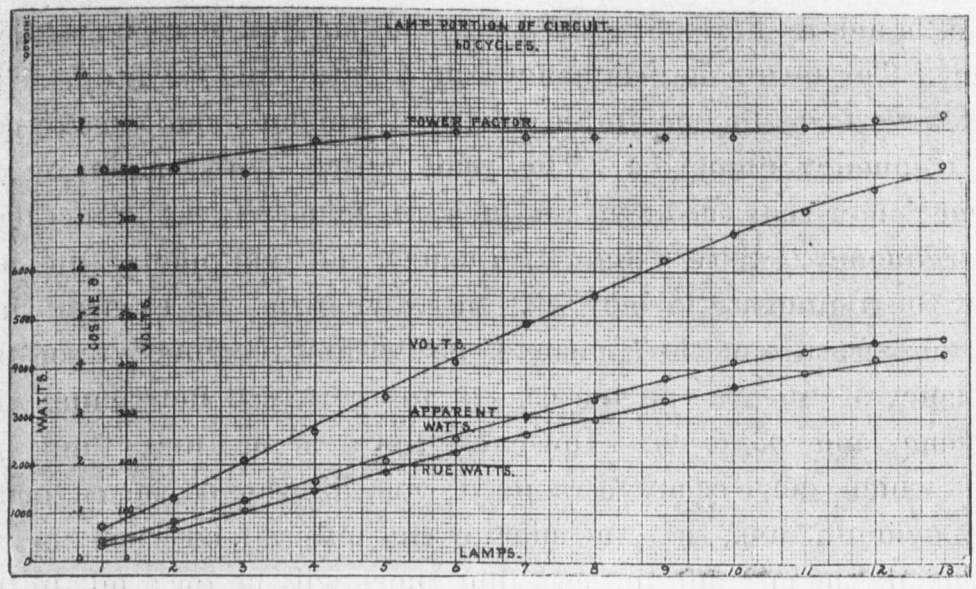
was much less than for the higher frequency, with a greater resulting candle power. The power factor was raised when a lower



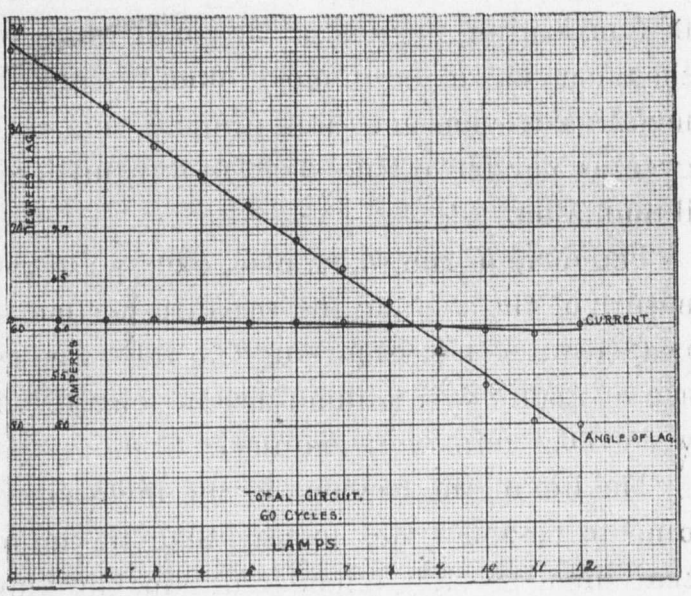
frequency was employed, with an equal expenditure of energy.

The alternating and direct current arcs differ widely in certain respects. The alternating arc does not exist when the current wave is at the zero point, and is hence extinguished twice during

each complete cycle. Before a proper amount of reactance was introduced into the circuit of each lamp, as was the case with the



earlier types of lamps, this momentary cessation of current gave rise to a flashing in and out of the lamps when first switched into circuit and was due to the inability of the line pressure to re-establish the arc so frequently, until the carbons were heated sufficiently to reduce the resistance and thus lower the potential required to form and maintain the arc. This fact led to a series of experiments by Wedding and Roessler, in which it was the purpose to discover the relation of the form of the electro-motive force wave to the mean spherical candle power. They made photometric tests of an alternating current arc lamp operated in turn by three different dynamos giving three distinct wave forms—the peaked, the semisoidal, and the flat-topped forms. The flat-topped form was found to be superior for lighting circuits.



During the interval of one-half a cycle when the lower carbon

is negative, the light emitted by its crater falls below that given by it when it is positive. This variation of candle power when the carbon is negative in character may, according to Fleming, fall as much as fifty per cent below the maximum positive brilliancy. The lower the frequency, the greater this variation. The best wave form for maximum efficiency depends somewhat upon the frequency employed. The photometric tests made by H. Gorges show that the effect of the wave form is greatly modified by frequency. With a high frequency, the photometer did not show the luminosity to vary with the wave form. It is clear that the temperature of the carbons is not without its effect upon the efficiency of the arc—an increase of temperature increasing the efficiency, and *vice versa*. However, there is an upper limit beyond which there occurs a wasteful volatilization of the carbons. It is evident, then, that the shorter the interval between the reversals of the current the less time there will be for a fall in the temperature of the negative carbon, and that a wave of the flat-topped form, the more nearly rectangular the better, would fulfill this condition most nearly.

If now this flat-topped wave should be produced so that the first or leading portion of each half wave were somewhat peaked, the affect would be to more quickly raise the temperature of the negative carbon and thus prepare the way for the following and greater portion of the wave to expand itself in the production of illumination

The form of the wave, also, exerts a decided influence upon the nature of the arc and the presure needed to maintain it. With a peaked wave, a pressure of 23.5 volts was required to maintain an arc of about two millimeters in length, while with a flat-topped wave, 30.5 volts were required.

The life of the carbons in the inclosed arc is found to be from nine to eleven times longer than in the open arc. This means that the necessary expense to trim the lamps is greatly reduced. On the other hand, the inclosing globes, unless kept clean and free from combustion products, very seriously reduce the candle power in both the alternating and direct current inclosed arcs. This offsets somewhat the decreased expense of trimming. The feeding interval varies from fifteen to twenty minutes, depending upon the sensitiveness of the feeding mechanism.

Quite a variety of inclosing globes are in commercial use, some

of which reduce greatly the candle power of the arc. It is great economy to reduce by every possible means the unnecessary losses at the translating devices of a lighting circuit, as well as to reduce them in the station and line transmission.

The following table by Williamson and Klinck is suggestive at this point, as showing the efficiency of the various inclosing globes:

	Per cent.
Holophane clear glass globe	87.0
Ground glass globe	79.3
Plain opal glass globe	68.5
Slightly opalescent globe	90.2
Flat opal glass globe	86.8

For street lighting, the alternating arc is superior to either the open arc or the direct current inclosed arc for long-distance illumination; this is particularly the case for distances at and beyond one hundred twenty-five feet from the lamp.

The curves appearing with this article represent the data as given by actual laboratory tests, and are self explanatory.

B. F. EYER.

RENOVATED BUTTER.

IT had become quite a popular belief prior to the passage of the oleomargarine law that many of the creameries were selling "process or renovated" butter for pure creamery butter. This undoubtedly grew out of the fact that many of the larger creameries manufactured renovated butter in connection with their creamery business.

Just what this renovated butter was or how it was made seemed to be a mystery to the average consumer. Some thought that old country-made butter was mixed with the creamery product, a process which would always be fatal to the quality of the output of the creamery. Others imagined that chemicals or drugs were used in some way to purify the old butter. Many looked with suspicion upon all creamery butter and were half afraid to use it.

In the consideration of the "oleo. bill" by Congress there was a clause added taxing renovated butter one-fourth of a cent per pound and adulterated butter ten cents per pound. This required a definition of the terms "renovated or process" and "adulterated." The department of agriculture prescribed the

rules and regulations in regard to "renovated butter," in accordance with the act of Congress approved May 9, 1902. The following excerpts are taken from these regulations:

"SEC. 2. The following explanation of the definition of renovated butter as it occurs in the law has been prepared by the department of agriculture and is adopted for guidance in connection with these regulations: (*a*) This grade or kind of butter may be made from one or more lots or parcels of butter, which has been or have been 'subjected to any process by which it is melted, clarified or refined and made to resemble genuine butter, always excepting 'adulterated butter' as defined by this act.' (*b*) The butter, to be subjected to this definition, must have been melted —that is, so affected by heat as to become of sufficient fluidity to move in a continuous stream of even consistency from one vessel to another, by pouring or pumping, because butter cannot be 'clarified or refined' unless it be melted to that degree. (*c*) The butter must, besides melting, have been subjected to some process by which it is 'clarified or refined.' Butter, or melted butter, may be clarified or refined by skimming, settling, aerating, washing, and other processes, through the action of heat, cold, agitation or motion, or rest. (*d*) Butter thus melted and clarified or refined becomes an oil or fat almost free from taste and color. To be again 'made to resemble genuine butter' it must have restored to it the butter characteristics or similitude of texture, granulation and flavor. For this purpose the processed or renovated butter is usually granulated by cooling, and churned or otherwise mixed with milk or skim-milk, or buttermilk, or cream, sweet or sour. It may or may not have common salt or artificial coloring added. To 'resemble genuine butter' the article must have passed through these or other processes, subsequent to melting, so that it looks, tastes and smells like 'butter,' having a similar appearance, consistency, texture, and flavor. (*e*) It may be assumed that the object of subjecting a lot or lots of butter to such a process is to remove rancidity, sourness, mold, or other fault or feature which has impaired its merchantable quality, or to otherwise renew or improve the product, so that the substance is truly 'renovated,' although such object is not expressed in the act."

"SEC. 16. Each manufacturer's package of renovated butter shall have affixed thereto a label on which shall be printed the

number of the manufactory and the district and state in which it is situated, together with the following notice:

"FOR RENOVATED BUTTER.
"Factory No.—, ——District, State of———
"Notice.

"The manufacturer of the renovated butter (or process butter) herein contained has complied with all the requirements of the law. Every person is cautioned not to use either this package again, or the stamp thereon again, not to remove the contents of this package without destroying said stamp, under the penalty provided by law in such cases."

The regulations also provide that if any chemicals or foreign substances, or if more than sixteen per cent water, milk or cream are held by the butter it shall be called "adulterated" and shall pay the tax of ten cents per pound.

It will seem from the above that the regulations are strict, and that which is popularly believed in regard to the creamery butter cannot now at least be true. Renovated butter must be sold for what it is, and the question naturally arises, is it good and wholesome food? It is probably true that there is nothing injurious about this class of butter, but every consumer must decide for himself if he is willing to pay for good creamery butter or eat the "renovated" article at two or three cents less per pound, made from the class of goods mentioned in clause (*e*) above. The fact that we have "renovated butter" comes from another fact, that the average butter made on the farm is not fit for the market until it is renovated, else there be no "renovated butter." It is a monument to an unwise and unprofitable system of dairying.

ED. H. WEBSTER.

The many fine brick sidewalks which the city dads built this summer were truly a blessing during the wet spells this fall. We only wish there were still more of them. The College needs a well-paved outlet straight south along the new road west of the city park and another one straight east from the main gate on Vattier street. Let the good work go on!

THE INDUSTRIALIST.

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PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
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LOCAL NOTES.

Capt. A. S. Rowan was one of the principal speakers at the reception to Admiral Schley, by the Kansas City Commercial Club, last week.

Professor Roberts will read a paper before the State Horticultural Society in December, on "Some Modern Conceptions in Plant Breeding."

The Horticultural Department is building a cinder walk from the west entrance of the new library rooms to the south entrance of the main building.

The experimental wheat plats of the Botanical Department are planted to a considerable extent on the nursery plan, the plants standing four by four inches apart.

The traction engine is on the road nearly every day, engineered by fine looking apprentice students. Every member of this course must learn to run it and feed it.

Professors Eyer and Webster and Mrs. Calvin will leave this week for south central Kansas to conduct a series of farmers' institutes in Sumner, Sedgwick, Reno and other counties.

The Gifford Bros., of Milford, will hold a sale of forty-five head of fine shorthorns from their well-known herd, at the Manhattan auditorium, December 16. Catalogues will be sent on application.

The Botanical Department has harvested this fall over two hundred varieties of late-grown potatoes, including many old and peculiar kinds. The object is to obtain material for experiments in graft hybridization of potatoes.

The iron posts and gates for the stalls in the new dairy stable have arrived from Madison, Wis., where they were manufactured, and are being inserted in the cement floor. The work of inserting them properly is a very tedious job.

The library has just received one hundred volumes of new books from Chicago and two hundred twenty volumes of rebound books from the State printing-office. The latter were sent to Topeka for rebinding sixteen months ago.

The Botanical Department is working over some fifteen hundred soy-bean plants which were selected in the field last summer. An attempt is being made to improve these by selection for earliness, general vigor and productiveness.

The December meeting of the Manhattan Horticultural Society will be held at Horticultural Hall of the College on Thursday, December 11. Everybody will be welcome to participate.

The laboratory tables for the Chemical Department of the Experiment Station are being built, and before long will be ready for use. The table tops and hood bottoms in this laboratory are of soapstone, and are among the finest things on the grounds.

Regent S. J. Stewart was here last Friday visiting his daughter and looking over the many improvements that are going on all the time. He intends to leave for Washington, D. C., this week to spend a month among the law makers and government officials.

The short course in domestic science this fall term has an attendance of sixty-two young women, and there is not a more energetic, hard working and better behaving class in the College. All the teachers speak well of the young women who compose the class this year.

The many students who live north and west of the College will be glad to hear that the new walk directly north from the Armory will be built as soon as the cattle sheds are finished. The proposed walk will be a great convenience to many students.

The great poultry show at the Agricultural College barn began yesterday. It will be open every day till Friday evening, and there will be no admission fee charged. Everybody is invited. It is expected to make the exhibition a great success. For particulars see the handbills.

President Nichols gave an address before the North Central Kansas Teachers' Association, at Clay Center, last Friday forenoon. The printed program gives the subject as "A Plea for a Higher Culture Among Our Teachers: Broader Scholarship, Less Slang, Better Business Methods, Better Address, Less 'Shop Talk.' "

Superintendent Rickman and his estimable wife entertained the employes of the Printing Department and the members of the *Students' Herald* staff at their home on Osage street last Monday night. The early part of the evening was spent in playing various kinds of games, music, and in having a good social time. Later in the evening refreshments were served, after which all departed feeling that they had been royally entertained.—*Students' Herald.*

We hope that those students who are somewhat inclined to cut classes and otherwise disobey the College rules will take warning from the recent suspensions and change their wayward course before it is too late. It is only just and right that ordinary loafers who are prone to enroll and take up valuable space in the College halls, with no higher purpose than to cause the Faculty trouble and be in the way of students who are striving to get an education, should be thinned out as fast as possible. The sooner the better.—*Students' Herald.*

The College football team played a game with Chapman on Thanksgiving, in Manhattan Athletic Park, defeating them 22 to 5. A week ago Saturday a game was played with the Haskell Indians resulting in a victory, 24 to 0, in favor of the "farmers." Our boys are beginning to "loom up."

Mrs. Calvin visited eleven classes in English during the past two weeks and gave talks on the arrangement and use of the College library. It takes some students a long time to discover what treasures are stored up for their use in the Library Department and the energetic efforts on the part of the librarian will undoubtedly bear rich fruits.

The Western Passenger Association has notified Secretary Coburn that a round trip rate of a fare and a third, open to everybody, has been granted on all Kansas railroads, for the thirty-second annual meeting of the State Board of Agriculture which will be held in Topeka January 14, 15 and 16. The annual meeting of the Kansas Improved Stock Breeders' Association will be held in Topeka during the first three days of the same week. Tickets will be on sale January 10 to 17, inclusive, and be good for return passage until and including Monday, January 19. This is the week in which the new State administration will be inaugurated and the new legislature convene.

ALUMNI AND FORMER STUDENTS

Prof. R. W. Clothier, '97, of Cape Girardeau Normal School, formerly assistant in chemistry at this College, read a paper before the annual meeting of the Missouri Valley Fruit Growers' Association, at St. Louis, last week.

We have received the announcement of bulletin No. 37, of the bureau of forestry, "The Hardy Catalpa in Commercial Plantations," by William L. Hall, '98, superintendent of tree planting in the bureau of forestry, and "The Diseases of the Hardy Catalpa," by Dr. Hermann von Schrenk. Part I of the bulletin contains a record of the growth of the hardy catalpa in some of the most extensive commercial plantations in this country. Many measurements were taken to determine the yield per acre and the net returns from these plantations, reckoned for posts and telegraph poles. The figures presented give an accurate idea of the returns to be secured in a large section of the Middle West, from the planting of hardy catalpa. A discussion of the important points in hardy catalpa culture is also included in this part of the bulletin. In Part II is given a description of the fungous enemies which assail the hardy catalpa. This part is based upon both field and laboratory investigations, and includes, in addition to the description of the diseases, practical suggestions as to their prevention. The character of the information given makes bulletin No. 37 of special importance to those interested, from a commercial standpoint, in the culture of forest trees. The bulletin contains fifty-eight pages and thirty plates.

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PROBLEMS IN ORCHARD POLLINATION.*

IT has been but a few years, since the settling up of the Western States, that the commercial growing of apples has been given much attention. Before the West opened and means of transportation became general, each Eastern farmer had his little orchard of many varieties, and his neighbor's orchard was so close that the same bees visited both and carried the same kinds of pollen to each. But since the demands of the market have so much increased and have become centered on a few popular varieties, it has been the practice to plant large areas to one, or at most, a few varieties, and new problems and new questions have been brought to the attention of the commercial orchardist. One of the most serious of these problems, and the one most affecting Kansas orchardists, because of the fact that so many of our large orchards are just coming into bearing, is the barrenness of some of these larger ones set to a single variety. A correspondent writes that he has in one body forty acres of Jonathans which are almost barren and he wishes to know with what variety he may graft the trees to insure pollination.

The idea of mixing varieties to insure pollination is not a new one. Darwin has taught that "Nature abhors perpetual self-fertilization;" that "It is injurious and results in inferior and less fertile offspring," and that "Plants are endlessly modified to insure cross-fertilization." Just how much the apple is modified to secure crossing of varieties will be seen later.

It has long been the practice of California prune growers to mix their varieties. Waugh (Vermont Experiment Station Report, 1897) found that most varieties of plums are self sterile; Waite (U. S. Division of Vegetable Pathology, Bulletin 5) shows results

*The necessity of accurate and scientific information concerning the pollination of our common fruits is recognized by everyone who has given the subject a moment's thought. In the work done by the Horticultural Department of the Kansas Experiment Station the peach, plum, grape and apple are the fruits upon which the most data has been collected. The above article is based upon the work done by Mr. Geo. O. Greene, Assistant in Horticulture, and submitted by him as his thesis in his work for the degree of Master of Science. The results of these and other experiments will be published later in bulletin form.

of many experiments carried on with the pear to show the affinity of certain varieties for the pollen of certain other varieties. Some of the most interesting discoveries made by Waite are, that the descriptions given by Warder, Thomas and Downing were true only for the fruits resulting from cross-fertilization; that the fruits from cross-fertilization were much larger and that the flavor was much better in the crossed varieties than the fruits resulting from self-fertilization.

Every one has noticed that isolated fruit trees failed to bear fruit though they blossomed full each year. The Wild Goose plum is a very good illustration of this self-sterility in fruit trees, familiar to every one who has planted this variety in isolated positions.

This self-sterility, as it is called, is the inability of the pollen of a plant to fertilize its own ovules or those of other plants of the same horticultural variety and is indicated in fruit trees by the continued dropping of the fruiting organs before the fruits have become well formed, although fruits often drop from other causes, as frost, general debility of the tree, etc.

No one can say why a variety should refuse its own pollen and accept that of another variety. Accepting Darwin's law that "Perpetual self-fertilization is injurious and results in inferior and less fertile offspring," we would admit, that, in the countless ages of the selection of the apple, inferior offspring and, perhaps, the entire loss of fertility has been avoided by self-sterility. In the apple self-fertilization has been guarded against in different ways, as will be seen in the descriptions and experiments which follow.

DEFINITION OF TERMS USED.

Self-sterility: Inability of pollen to fertilize ovules of same horticultural variety.

Self-fertile: A plant is said to be self-fertile when the pistil will accept pollen from a plant of the same horticultural variety.

Cross: Union of pollen cell and ovule of two distinct horticultural varieties. In no case is it meant the transfer of pollen from one flower to another on the same tree or from one flower of a variety to the pistil of another individual tree of the same horticultural variety.

Pollination: Act of transferring of pollen to the pistil.

Fecundation: Union of pollen cell and the ovule.

Fertilization: A general term to include both the preceding terms.

The flower of the apple is regular and perfect in all of its parts; petals and sepals five, petals varying in color from a pure white to a faint rose; stamens twenty or less, filaments of two lengths, one set of anthers ripening later than the other (see figures 1 and 2), anther two celled, dehiscing along the outer margin, the two cells not always dehiscing at the same time but the dehiscance of both taking place within a very short period; pistils ripening before the stamens, stigma extremely papillose and in a condition to

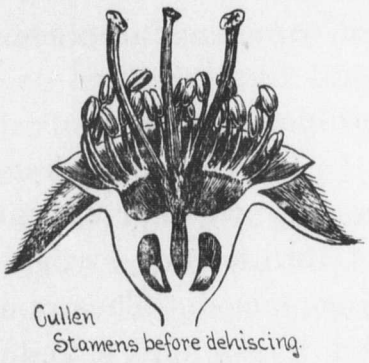


Fig. 1.

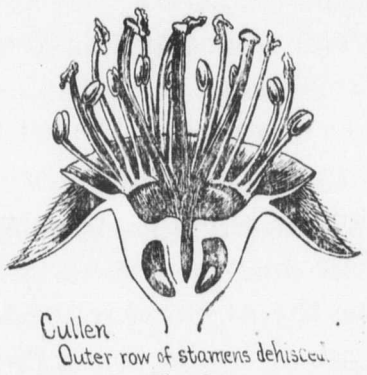


Fig. 2.

catch and retain pollen before it is receptive, though it is in a receptive condition as soon as the flower opens; stigma secreting a sticky fluid which also aids in holding pollen falling on the pistil, much more of the fluid being secreted by the pistil if the stigma is not pollinized with acceptable pollen than would be if it were fertilized as soon as receptive; pistils remaining erect and fertile for several days after maturing if acceptable pollen is not applied to them. Upon the reception of pollen the pistil wilts in a very few hours, or at most, in the course of a day.

In the bud the stamens are turned inward toward the center of the flower while each pistil is recurved on the style. The pistils are the first to assume an erect position, as may be inferred from their early ripening. The ovary is inferior, inserted below the calyx. Figure 1 shows the position of the parts of the flower. The flowers are sidewise, turning toward the light, thus preventing wetting of the pollen and insuring self-pollination if no pollen is brought from another flower. Although Nature has made self-fertilization mechanically possible in the apple, she has made self-fecundation impossible in the majority of cases, and the experiments carried on in the College orchard go to show that self-

fertility is the exception and not the rule. These experiments also show that these self-fertile varieties are safe ones to use for the fertilization of other self-sterile varieties.

CAUSES OF FAILURE OF BLOSSOMS TO SET FRUIT.

Some of the causes of failures of Kansas orchards to set fruit are here enumerated:

1. The trees or the blossoms may be injured from drought.
2. The fruit buds may be injured from winter freezes.
3. The fruit buds may be injured from late spring frosts.
4. The blossoms may be injured from a lack of proper nourishment.
5. The tree may fail to bloom from an excess of certain kinds of nourishment.
6. Fruits may fail to set from improper pollination.

1. *The trees or the blossoms may be injured from drought.*—It sometimes happens that we have a very wet spring with such weather as will stimulate the trees into a very strong growth during the earlier part of the growing period. These periods of extreme growths are often followed by summers and falls of extreme drought. Under such conditions the fruit trees are unable to set fruit buds with sufficient vitality to carry them far enough to form fruit. Fruit buds make heavier demands on the tree than leaf buds. After such extremes as the above the tree uses its whole energy to recover its vegetative power, and it may often happen that a tree will fail to set fruit from this cause.

2. *The fruit buds may be injured by winter freezes.*—It is impossible to say just how much freezing the fruit buds of the apple will stand. In sections of this country where the air is less dry than in the West, the buds will stand a much lower degree of temperature than they will in our dry atmosphere and a very low temperature of one winter will have less of an evil effect on the fruits of our region than another winter when the thermometer does not record so low a degree of temperature. There are so many influences that effect the formation of fruit buds and their proper nourishment that it is impossible to say how far and to what extent freezing effects the next summer's crop of apples. The vitality of the buds, their maturity, the condition of the atmosphere as to moisture, the amount of moisture in the soil and the amount of snow on the ground are a few of the things we must consider.

3. *The buds may be injured by late spring frosts.*—The amount of injury to buds from frosts cannot be computed; a few days before or after the blossoming period may make an untold amount of difference. Buds that have been injured by frosts may yet have enough vitality to bloom and yet not have enough to set fruit. Some buds, from their position, their state of maturity, or because they are more hardy, may be less injured than others on the same tree. Varieties considered tender may be able to set fruit after experiencing an unusually heavy frost, yet fail the next year when lighter frosts have touched them. The advancement or retardation of the buds may account for this. Though neither the pistil nor the stamens are badly injured by the frost, the ovary may be so badly injured that fecundation is impossible. Heavy frosts during the blossoming period may so impair the fruiting organs as to cause the dropping of the fruits after they have set.

4. *The trees may lack proper nourishment.*—This may be from a lack of water as shown in (1) or it may be from a lack of other plant foods. Orchards which have been improperly cultivated, or which have grown heavy crops of apples and have not had the elements removed by these crops returned, may fail to set fruit buds in the proper manner. In the experiment with pollen from an improperly nourished Missouri Pippin, it was found that this pollen was very much less potent than the pollen from a more thrifty tree. Poorly nourished trees were found to be more liable to self-sterility. Many orchards set in the early history of the different parts of the State have ceased bearing, in all probability from the effects of continued starvation, and many other younger orchards fail to set fruit from the same cause.

5. *The trees may fail to set fruit from an excess of certain kinds of nourishment.*—The above may be the case or they may have plant food at the wrong season of the year. It is a well-known fact that the reproductive and the vegetative powers of a tree are exercised in direct opposition to each other, and a tree making too great a vegetative growth is liable to be barren. This is especially true of orchards planted close to barns, feed lots or corrals where the owner is in the habit of dumping manures. Under such favorable conditions to the development of the vegetative portion of a tree, it would be much longer in reaching maturity and would never bear as well as another tree planted in soil with nearer the optimum amount of plant food or with plant food bet-

ter adapted to its needs. On such a tree the fruit buds would be few and would go into winter in an immature condition, with few chances of escaping winter injury. Orchards may fail to set fruit because of too great a growth during the season when fruit buds are forming. A later fall growth may open the road to winter injury because of improper ripening of the wood. Winter killing of the immature wood, together with the fruit buds, is very often the result.

6. *Blossoms may fail to set fruit from improper pollination.*— Though the trees may be in perfect health, the winter may not have been severe and the orchard may be a mass of bloom, there may be only a fraction of a crop. Isolated trees which are self-sterile cannot set a full crop of fruit because so few bees, the only agents of pollination acting at a distance, visit two trees very far apart during the same absence from the hive, and very few of the blossoms would thus be fertilized. The same would be true of large blocks of trees planted to single varieties. The bees would carry little else than the pollen of that variety. Another case of improper pollination is noticed when the weather is damp and cold during the blossoming period. Such weather prevents the work of bees and often causes the germination or the decomposition of the pollen grains. Even when the pollen grains are not entirely spoiled, may it not happen that when slightly wet pollen falls on the stigma it possesses just enough vitality to germinate and start fecundation, but not enough to carry it through all the changes necessary to complete fertilization? If such be the case, the pistil after responding would waste away. Vigorous pollen would thus be prevented from fertilizing the pistil, when the weather became bright and warm enough to properly ripen the pollen and bring out the bees, and fruit would fail to set as it should.

Dry, hot and windy weather may so badly injure the stamens that they cannot properly mature their pollen or it may cause the dehiscence of the anthers before the pollen is mature. The same theory may be applied to the partial fecundation of the ovules by pollen injured in this manner as that injured by wet and cold.

Pollen grains may be entirely washed away during extremely wet weather or blown away during dry periods. High winds may waste the greater amount of pollen and may, during very hot weather, when the pistil is in a receptive condition, so entirely dry

up the fluids secreted by the stigma as to make germination impossible or even blow away what pollen is held by the stigma by reason of its roughened surface. Dust storms during the time when the pistil is receptive may make pollination impossible from the fact that the papillose stigma catches dust particles which absorb the juices there secreted and thus covers the stigma with a coating of very fine particles of dust firmly cemented together by this sticky fluid. Such dust storms as visited the West this spring cannot but injure the apple crop.

CONDITION OF TREES AND PLAN OF WORK.

The summer of 1901 was a banner apple year for Kansas and the orchards in this locality certainly upheld their portion of the State's reputation. Many of the trees of standard varieties were broken down under their load of fruit, which hung well during the very hot, dry weather of July and ripened well after the rains came in the late summer and fall. In most of the well-cultivated orchards the trees made a late fall growth and went into winter with an abundance of rather unripe wood, though with a great many well-formed fruiting spurs. Except for the immature wood every indication was for a good show of bloom this spring. The winter was very dry up till January, when our first snow came. A short time before this snow, with the ground in a very dry condition, the thermometer went down to 18° F. at its lowest temperature and stayed near that mark for several days. The ground was entirely bare of snow and the freeze was certainly very hard on all plants not protected. This period of cold weather entirely killed the peach buds in our locality. It is hard to say whether this freeze would have killed the apple buds or not had there been a sufficient amount of moisture in the ground, or whether or not it is responsible for the small show of blossoms in the orchard this spring. It certainly had its influence.

The work of experimenting with the potency of blossoms was begun April 20, 1902. The spring was very backward up till April 20, when with a very strong south wind blowing the thermometer recorded the high temperature of 97° F. This brought forth the first show of bloom. On April 21 the first flowers of Cooper Early and Jonathan were emasculated and bagged. April 22 the weather turned much colder and remained so for several days, causing most of the varieties to be very backward about

coming into bloom. This state of affairs very much favored the work in hand. April 24, 25 and 26 were very windy and full of dust and many of the pistils of the emasculated flowers were injured by having the bags blown against them.

The work of emasculation was begun as soon as the bud was large enough to handle without too much injury to the receptacle usually three or four days before the flower came into bloom. For the purpose of emasculation a sharp pair of fine scissors and a strong, sharp pair of forceps were used. The forceps gave the most satisfaction. The stamens were either pulled out with them or the anthers were broken off by holding the flower against the forefinger of the left hand and then with one jaw of the forceps the anthers were rubbed off. After this a number three manila paper bag was firmly tied over the cluster of emasculated flowers to prevent pollination by wind or insects. Figure 3 shows a bud in proper condition for emasculation. Figure 4 shows a flower after it has been emasculated. On very quiet days when the trees were not in motion, about one hundred twenty-five flowers were emasculated in an hour. On windy days not much more than half that number. The emasculation did not seem to injure the pistils in the least, as is shown by the records of the experiment on trees where the only fruits setting were in the bags and from hand pollination.

Fig. 3.

Fig. 4.

Where it was the intention to test the flower to the susceptibility to its own pollen, the cluster of flowers were covered without emasculation, at the same time that the others were emasculated. As much care was taken to insure pollination in these as in the emasculated flowers, though from a microscopic examination of several pistils in the bags during the time when the anthers were dehiscing, it could be readily seen that this precaution was not necessary, as many grains of pollen could be seen adhering to the pistil.

The pollination was begun, in most instances, as soon as the tree used as the pistillate parent was about three-fourths in bloom. The intention was to pollinate each tree at least before the tree was in full bloom. Good results were obtained in some cases where the pistils were left much longer than this, the pistils

in the bags remaining upright and in good condition until the petals began falling. As will be noticed from the records of the work, each staminate parent was used on the pistillate parents as nearly as possible at the same time, it being thought that the best and most potent pollen would be obtained at a time when the tree was about-three fourths in bloom.

The flowers for pollinating purposes were cut from the tree and carried in one of the paper bags used to cover the emasculated flowers. This bag was kept closed except when pollen was desired. For this purpose flowers were selected in which the anthers were just dehiscing. When pollen was desired for pollinating a pistil the dehiscing anther was removed and rubbed over the forefinger with the thumb and the pistil pollinated by touching the stigma with the pollen-covered finger. As was said above, all flowers were pollinated with a certain variety of pollen as nearly as possible at the same time. In doing this there was little danger of other than the desired pollen being applied to any pistil. After the cluster was pollinated the manilla paper bag was again tied over the cluster, this time with a label on which was written the two parents, and a record was kept in a note book of the number of flowers pollinated with the variety. After finishing with any variety the hands were carefully washed so that the same pollen might not enter into any two experiments. It is entirely possible that error might have entered into the experiments, either from pollen blowing onto the anthers used for pollination before they were cut for the experiment or by pollen blowing onto the pistils during the time when the pistils were being pollinated, though this was a very short time. Such error certainly could not have entered into the five pistils of any variety and it would be absolutely impossible for the pollen of any one variety to fertilize the pistils of twenty flowers, which were usually used in each variety. It would hardly be expected, either, that a very great amount of pollen could alight on any one anther during the time when it was dehiscing.

It has been thought, and it seems to me, not without some foundation, that season and the individual tree has most to do with potency and the self-sterility or self-fertility of varieties. Prof. F. A. Waugh in an article, "Pollination of Apples," tells of covering nineteen blossoms of Ben Davis to test the effect of that variety's pollen on itself. He says that not a single fruit set

and came to the conclusion that Ben Davis is self-sterile. These flowers were, probably, on the same tree, and if this be the case, it may have been only an individual character and not one true of all the trees of that variety. Care in the present experiment was taken that the individual characters should not spoil the experiment and blossoms were covered on two or more trees. In the case of the Ben Davis, twenty-six of the one hundred blossoms pollinated set fruit, though the fruits were not so large nor so vigorous as those from cross-fertilization. This statement is generally true of the cross and self-pollinated fruits. It was shown that the self-fertilized fruits showed a greater tendency to fall from the tree before they had obtained a size as large as a hazel-nut.

POTENCY OF VARIETIES.

The experiments go to show that some varieties possess more potency in their pollen than do others, both on their own pistils and on the pistils of other varieties. In the following it is shown that a few varieties stand in the lead as pollinizers of the orchard. Proportion of fruits setting to number of flowers pollinated with pollen from the variety named: Ben Davis, 25 per cent; Huntsman, 37½ per cent; Cooper Early, 37½ per cent; Grimes Golden, 29 per cent; Jonathan, 52½ per cent; Smokehouse, ½ per cent; Missouri Pippin, 33⅓ per cent; Winesap, 30 per cent; Wine, 29 per cent.

Of all those tested in this experiment Jonathan is the best, Cooper Early the second and Huntsman the third. The potency of these three varieties was strongly shown when used on certain trees of Grimes Golden, Arkansas Black and Mammoth Black Twig which threw off all their blossoms and failed to set a single fruit outside of the bags. Leaving out the above three varieties, it will be seen that the percentage will be much higher in favor of Jonathan, Cooper Early and Huntsman. A glance at the table will show their value as fertilizers for the orchard of standard varieties. Though Jonathan is in the lead as a fertilizer of other pistils, its own pistil is very exclusive in its selection of pollen for fertilization. Cooper Early stands first as the pollenizer of this popular variety.

Referring to the bloom chart, it will be seen that Cooper Early covers the entire period of Jonathan. Combinations may be made with Huntsman and Jonathan to pollenize most of our commercial varieties of apples, if we plant them in rows as we do

strawberries. This sort of planting would not in any way inconvenience the commercial orchardist, as he usually distributes his barrels and pickers along the rows and never tries to pick his orchard in blocks.

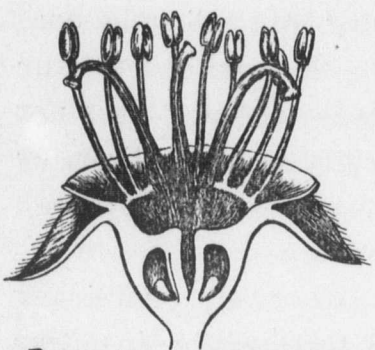
One of the greatest surprises experienced while in the work of testing the potency of varieties was shown in Kinnaird. This variety did not bloom until about April 28 and so was not used in the experiments as staminate parent. On April 28, thirty-five unopened flowers were covered to ascertain its susceptibility to its own pollen. These bags were opened May 3, and contained thirty-five well-formed fruits a very little smaller than the remainder of the fruits on the tree which was loaded. It is not known how much value there is in this variety as a fertilizer for Ralls and other late-blooming varieties, but great results are hoped for it in future experiments.

Comparing varieties in fruit descriptions as to their prolificacy or barrenness with those of cross and self-fertilization in these experiments, it will be seen that those varieties listed as shy in bearing are those in which the selective power on the pistil is developed to the injury of the fruitfulness of the variety. This is especially true of the Jonathan which, though it has the power to fertilize nearly every other variety in the orchard, its pistils respond to but a very few varieties of pollen. The opposite is almost as true of the Ben Davis which, though its pistils respond to almost any variety of pollen, has very little value as a fertilizer for other varieties. Its free acceptance of other varieties of pollen is what makes Ben Davis so sure a bearer and so popular a variety.

NEED OF A MORE SYSTEMATIC AND NATURAL CLASSIFICATION OF VARIETIES OF APPLES.

The selective power or the lack of that power in pistils of the variety of apple may truthfully be said to be inherited quality in seedlings of apples possessing either the one or the other, and it would seem that, had we a better form of classification of varieties of apples, we could much more easily tell what varieties to plant near other varieties to secure the best results. Though there are hundreds of varieties of apples, they have sprung from a very few seedlings brought to this country in its earlier history or have been introduced later from Russia, these latter belonging to definite groups which might be absolutely classified. Several years

ago Prof. W. J. Beal, of Michigan, published a series of articles on the classification of apples by their flowers. Pomologists gave little attention to the work and nothing has been heard of it since. Orchardists need a more scientific and systematic classification than is offered by Thomas, Downing, and Warder, who base their classification on season or color. In the study of the forms of blooms and the size and shape of the organs of the flowers it was found that each variety possesses definite characteristics that might be used to distinguish it from other varieties. These characteristics are often modifications to insure pollination or to prevent self-fertilization, as in the case of Grimes Golden, in which the pistils recurve outward as shown in figure 5. In some of the flowers of this variety this character is developed to such an extent as to make self-pollination absolutely impossible. The position of the pistil also insures pollination from visits of bees. Other forms of pistils are shown in Ben Davis, which has a very straight, upright pistil, and Smokehouse, which has a very large, knobbed pistil, figures 6 and 7.



Recurved pistils of Grimes Golden
Fig. 5.

Smokehouse
Fig. 6.

Ben Davis
Fig. 7.

These modifications of pistils, the habits of the anthers in dehiscing, the shape, size and color of the flower, the fruits and the definite characters of the lately introduced Russian varieties, all offer a basis of scientific classification of the apple. This classification might be in groups, possessing certain characters, much in the same way as Waugh has classified the "Apples of the Fameuse Type" (Vermont Experiment Station Bulletin 83, 1900). Such a knowledge of relationship might be used to insure wider crosses and greater fruitfulness in our orchards rather than the present hap-hazard method of planting very closely related varieties near each other. These characters might well lead one to think that Winesap, Arkansas Black, Mammoth Black Twig and, perhaps, Benoni are closely related.

AGENTS OF POLLINATION.

During the years of especially favorable weather and when all things are in the proper conditions for the largest crops and the

greatest fruitfulness, the apple seldom sets more than from four to seven per cent of the flowers borne. The conditions must be favorable beyond expectation when ten per cent of the flowers set fruit. In the letter referred to above, the correspondent asks why more apples were borne on the north side than on the south of his trees in the summer of 1901. Taking the bloom chart for 1901 and comparing the directions of the wind during the days when the trees were in bloom, it will be seen that the wind held steadily southwest, blowing from five to twenty miles per hour. The question then arose as to why the blossoms on the south side of the tree were not fertilized by the wind carrying pollen from the tree directly south of it in the same row, if the wind is an agent of pollination. The theory was advanced at the time that perhaps bees did most of the work of pollination and worked out of the wind. Later experiments have gone to show that this is largely true, though they do work in the wind. During the blooming period of Huntsman, when it was not blowing a gale, the wind was south or east. To find out how much truth there was in the above theory the bees were counted on each side of the tree in a hasty way so as to count as few as possible twice. During the time when Huntsman was in full bloom with an east wind and the sun shining warmly there were counted twenty bees on the west side and eight on the east. Taking the same tree with a wind blowing at a rate of about seven or eight miles an hour from the south and small "choppy" clouds flying, there were counted sixteen bees on the north side and five on the south. On April 30 Kinnaird was in full bloom and an east wind was blowing at a rate of ten or twelve miles an hour. The day was warm and sunny and the bees were out in force. Five bees were counted on the east side and ten on the west of one tree and on another of the same variety four bees were counted on the east side and sixteen on the west. These figures cannot be laid to the bees preference to sunshine or shade as they worked in the full sunshine in one case and in the shade on another. There was not much difference in the temperature for the different days. By watching the bees during the time when the work of pollinating the flowers was being carried on, it was noticed that in every case the bees chose the side of the tree most protected from the wind. The honey bee was the principal visitor, though other bees were noticed to be at work. But two bumble bees were notice dur-

ing the whole week that the work was being carried on. Six species of bees were noticed at one time at one tree. Bees were noticed to visit the same flower five or six times during the course of fifteen or twenty minutes, and it is safe to say that each flower was visited twenty-five or thirty times during the day, and could scarcely have escaped pollination from this source. Many other insects were seen to visit the flowers to eat the pollen, to gather honey or to prey on other insects. In any case they may have, to some extent, aided in pollination. The greatest agent of pollination is undoubtedly the honey bee, though in its absence other species would carry on the work to such an extent as to insure a crop of apples were the weather favorable for the work of bees during the blooming period.

To ascertain the extent to which the wind is an agent of pollination, microscope slides were set in the orchard to catch pollen. These slides were prepared by smearing them with pure glycerine. The slides were numbered and the height and distances were recorded for that number. Afterwards these slides were taken in and examined with a microscope to find how many pollen grains had been caught. The days when these slides were put in the orchard were ideal for pollination. The sun was shining and a great many anthers were dehiscing. The wind was blowing at a rate of about five or six miles an hour. The slides set very near a full blooming Rome Beauty were left four hours. Number one was set at a height of about six feet and twenty feet away from the tree, but one grain of pollen was found to adhere to it; number two at eight feet high and twelve feet from the tree caught but one pollen grain; number three at a height of three feet and fifteen feet from the tree caught but five grains.

On April 28 slides were set near a very full blooming Kinnaird and left seven and one-half hours in a wind blowing four or five miles per hour. Number four was set at a height of six feet, fifteen feet from the tree, and caught ten grains of pollen. Number five was set at a height of six feet, twenty-five feet from the tree, and caught but three grains of pollen. Number six at a height of three feet, fifteen feet from the tree, held five grains of pollen. The same day slides were set near a tree of Cullen and left for the same length of time, seven and one half hours. Number seven was set at a height of eight and one-half feet, thirty-three feet from the tree, and caught but seven grains of pollen.

TABLE SHOWING RESULTS OF POLLINATION.

Staminate and Pistillate Parents.	Date of Emasculation. April	Date of Pollination. April	Number of Flowers Pollinated.	Number of Fruits Setting.	Remarks.
Ben Davis x Ben Davis	.....	.....	100	26	Small; unthrifty.
Cooper Early x Ben Davis	22	26	26	19	
Grimes Golden x Ben Davis	22	26	23	13	Rather weak.
Huntsman x Ben Davis	22	27	18	15	
Jonathan x Ben Davis	22	25	21	15	Rather strong.
Mammoth Black Twig x Ben Davis	24	28	12	5	
Missouri Pippin x Ben Davis	24	28	27	15	
Wine x Ben Davis	24	28	17	5	
Winesap x Ben Davis	24	28	26	8	
Ben Davis x Cooper Early	21	28	22	10	
Cooper Early x Cooper Early	.....	26	100	83	[1]
Grimes Golden x Cooper Early	21	26	22	12	Small.
Huntsman x Cooper Early	22	27	17	11	Strong; thrifty.
Jonathan x Cooper Early	21	25	12	12	Large; strong.
Missouri Pippin x Cooper Early	21	28	21	14	
Ben Davis x Grimes Golden	22	27	13	2	[2]
Cooper Early x Grimes Golden	22	26	26	16	Very small.
Grimes Golden x Grimes Golden	.....	28	106	0	
Huntsman x Grimes Golden	22	26	25	5	[3]
Jonathan x Grimes Golden	22	25	15	6	
Mammoth Black Twig x G. Golden	22	28	20	0	[4]
Missouri Pippin x Grimes Golden	22	28	26	0	
Ben Davis x Huntsman	22	28	20	3	[5]
Cooper Early x Huntsman	22	26	18	6	
Grimes Golden x Huntsman	22	26	20	8	
Huntsman x Huntsman	.....	28	100	1	
Jonathan x Huntsman	22	25	20	10	
Missouri Pippin x Huntsman	22	28	20	1	
Ben Davis x Jonathan	21	27	13	8	
Cooper Early x Jonathan	21	25	15	10	
Grimes Golden x Jonathan	21	26	16	11	
Huntsman x Jonathan	21	26	24	20	
Jonathan x Jonathan	.....	27	120	30	
Mammoth Black Twig x Jonathan	27	28	14	6	[6]
Missouri Pippin x Jonathan	21	28	18	3	
Ben Davis x Mammoth Black Twig	27	27	20	4	[7]
Cooper Early x M. Black Twig	23	26	20	0	
Grimes Golden x M. Black Twig	23	26	23	0	
Huntsman x M. Black Twig	23	26	18	1	[8]
M. Black Twig x M. Black Twig	.....	28	98	0	
Smokehouse x M. Black Twig	23	26	21	0	
Cooper Early x Smith Cider	22	26	7	2	Very large.
Jonathan x Smith Cider	22	25	5	2	
Smith Cider x Smith Cider	.....	.....	5	1	
Jonathan x Smokehouse	23	25	18	10	[9]
Smokehouse x Smokehouse	.....	.....	130	23	
Ben Davis x White Pearmain	22	27	16	5	[10]
Huntsman x White Pearmain	22	27	11	2	
White Pearmain x White Pearmain,	.....	.....	75	14	
Ben Davis x Wine	23	28	21	2	
Cooper Early x Wine	23	26	17	4	
Grimes Golden x Wine	23	26	16	0	
Huntsman x Wine	23	27	19	1	
Jonathan x Wine	23	25	14	7	
Missouri Pippin x Wine	23	28	20	5	
Wine x Wine	.....	28	97	17	

[1] Small, though in good condition.
[2] Only fruits on one tree from hand pollination; on other two of five.
[3] Only fruits on one tree from hand pollination; on other two of five.
[4] Trees from which pollen came set no fruit.
[5] Huntsman bore large crops of apples in 1901, and few fruits set this spring. More fruits set from hand pollination than on other parts of trees.
[6] The last bloom to come out; pollen may have been less fertile.
[7] No fruit set on tree except from hand pollination.
[8] Very much the largest fruit on tree.
[9] Bore very large crop in 1901. Set very few fruits this spring.
[10] Very few fruits set on trees.

From foregoing results it will be seen that the wind does aid in pollination. The reason why more grains of pollen were caught by the slides further away from the tree than those close to it is

because the grains of pollen hold together to some extent until they are blown apart by the wind. Though this is all true it cannot be expected that the wind is much of an agent in the pollination of orchards. To illustrate, let us compare the apple with the pine. The pine is fertilized almost entirely by the wind and without doubt there are as many pistils to fertilize in pine as in the apple; yet, though there are showers of pollen from the pine that make the ground yellow, some of the pistils escape fertilization, as will be seen on the examination of a pine cone, by the number of infertile seeds it contains. By comparing the amount of pollen produced by the apple with that produced by the pine, it will readily be seen that the wind is a very insignificant agent in the pollination of our orchards.

The notes as to the number of pollen grains were taken for about one square centimeter. As each apple blossom contains five pistils and each is only the fraction of a centimeter, wind pollination would be more accidental than otherwise.

G. O. GREENE.

There are 9106 schoolhouses in Kansas and 11,709 schoolteachers. There have been 137 new schoolhouses built during the past year. Of the teachers, 8323 are schoolma'ams and the rest are men. Sumner county has more schoolhouses than any other county, lacking only one of 200, while Wyandotte county leads in the number of teachers, having an even 300. Shawnee county has 126 schoolhouses and 277 teachers.

The basket-ball game between the juniors and sophomores on Saturday, played on the north campus, was one of the most spirited athletic contests of the season. The members of both classes were present in large numbers and encouraged their champions vociferously. The game resulted in a score of fourteen to four in favor of the sophomores.

The coal supply in the coal bin of the power-house caught fire by spontaneous combustion last week, but no harm was done beyond the consumption of considerable time on the part of the firemen.

Professor Walters has presented the Preparatory Department with a large historic map of the United States.

Regent McDowell was here one day last week.

THE INDUSTRIALIST.

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PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

The fall term will close December 19.

Read the Topeka *Daily Capital;* ten cents a week. Student John Calvin, carrier.

The new printing-presses are on the road and will be placed during the holiday vacation.

The College was presented with two Tamworth sows from the Nebraska Experiment Station.

Professor Ten Eyck will occupy the office room on the second floor of Agricultural Hall, recently vacated by Professor Willard.

Professor F. A. Waugh, '91, of Amherst, Mass., has shipped the pomology class a barrel of apples for identification and comparison.

Prof. L. G. Carpenter, director of the Colorado Experiment Station, stopped off between trains and visited the College and his sister, Mrs. Mayo.

The College band numbers thirty-four members this term and is making rapid progress. It has taken part in the dress parades several times, and furnished two or three selections at each of the Saturday afternoon rhetoricals.

The State Horticultural Society will hold its thirty-sixth annual meeting in the rooms of the society in the capitol building at Topeka, December 29 to 31. The College will be represented by Profs. E. A. Popenoe, H. F. Roberts, A. Dickens, and D. E. Lantz.

Rev. W. A. Hoffman addressed the students in chapel last Tuesday morning on the work of the Kansas society for assisting ex-prisoners. The reverend gave some very interesting statistics concerning the ratio of illiteracy among the inmates of the Kansas penal institutions, showing that education is a preventative of crime.

The equipment of the Musical Department has been very materially increased this term by the addition of two new upright pianos, new rubber covers for all the pianos, including the concert grand. Three of Conn's latest and best band instruments, as follows: One $B^{\flat}$ cornet ("Conn-queror"), a $B^{\flat}$ trombone, and an $E^{\flat}$ mellophone; also, two piccolos and a single-headed trap drum for use in the orchestra, together with a fine selection of new music for both orchestra and band.

Mr. Theo. Scheffer, the new assistant in zoölogy, began his work at the College Monday. He has just completed work at Cornell University and received the degree of A. M.

Coach Deitz, of the College Athletic Association, departed for Chicago last Saturday morning. From there he expects to go to his old home at Moline, Ill. Although a lawyer by profession, he is recognized as one of the best of scientific football players and the College team is beginning to show the results of their excellent training.

Mr. J. Q. A. Shelden, of Manhattan, has kindly donated to the College eight volumes of Wallace's American Trotting Horse Register; also five volumes of Wallace's Year-book. The College library has completed the set of the Registers to date. The donation of Mr. Shelden is highly appreciated as the Register alone is worth at least $45, and some of the volumes are rare and perhaps could not be had at any price.

Prof. A. M. Ten Eyck arrived from Fargo, N. Dak., last Sunday, and reported for duty as the head of the reorganized Department of Agriculture. His family will arrive the first of the year. The professor is a bright and intelligent looking man and of a practical turn of mind. He comes to us highly recommended, and we predict for him a successful career in the land of big corn bottoms and broad alfalfa fields.

The Botanical Department of the Kansas Experiment Station desires to obtain the use of a limited amount of weedy native pasture land for five years, for the purpose of testing different methods of restoring the wild forage grasses. Farmers in the vicinity of Manhattan, who have weedy native pasture and who would be willing to devote a portion of it to experimental purposes for the time mentioned, are invited to correspond with Professor Roberts. In writing, describe the land by section and quarter, state amount available, whether hill land or level prairie, and state further whether cattle could be had on the spot for grazing tests. Address, H. F. Roberts, Botanist, Kansas Experiment Station.

The State Agricultural College poultry show, held last week in the exhibition room at the barn, was the greatest exhibition of the kind ever held in the State. There were birds here from Illinois, Missouri, Nebraska, and all parts of Kansas, seven hundred ten fowls having been entered besides those belonging to K. S. A. C. The largest exhibitors were N. D. Bass, Kansas City, Kan.; Mrs. McGill and H. C. Short, Leavenworth; Mrs. Jennie Warren, Cottonwood Falls; and Casper Dice, Roca, Neb. One exhibitor had sixty-five birds. C. H. Rhodes, of Topeka, officiated as judge. The prizes were mostly given by Manhattan merchants and their value was over $600, being the largest list ever offered in Kansas. Visitors were here from all parts of the State and all expressed themselves greatly pleased with the successful efforts of the College in this important branch of animal husbandry.

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THE INDUSTRIALIST

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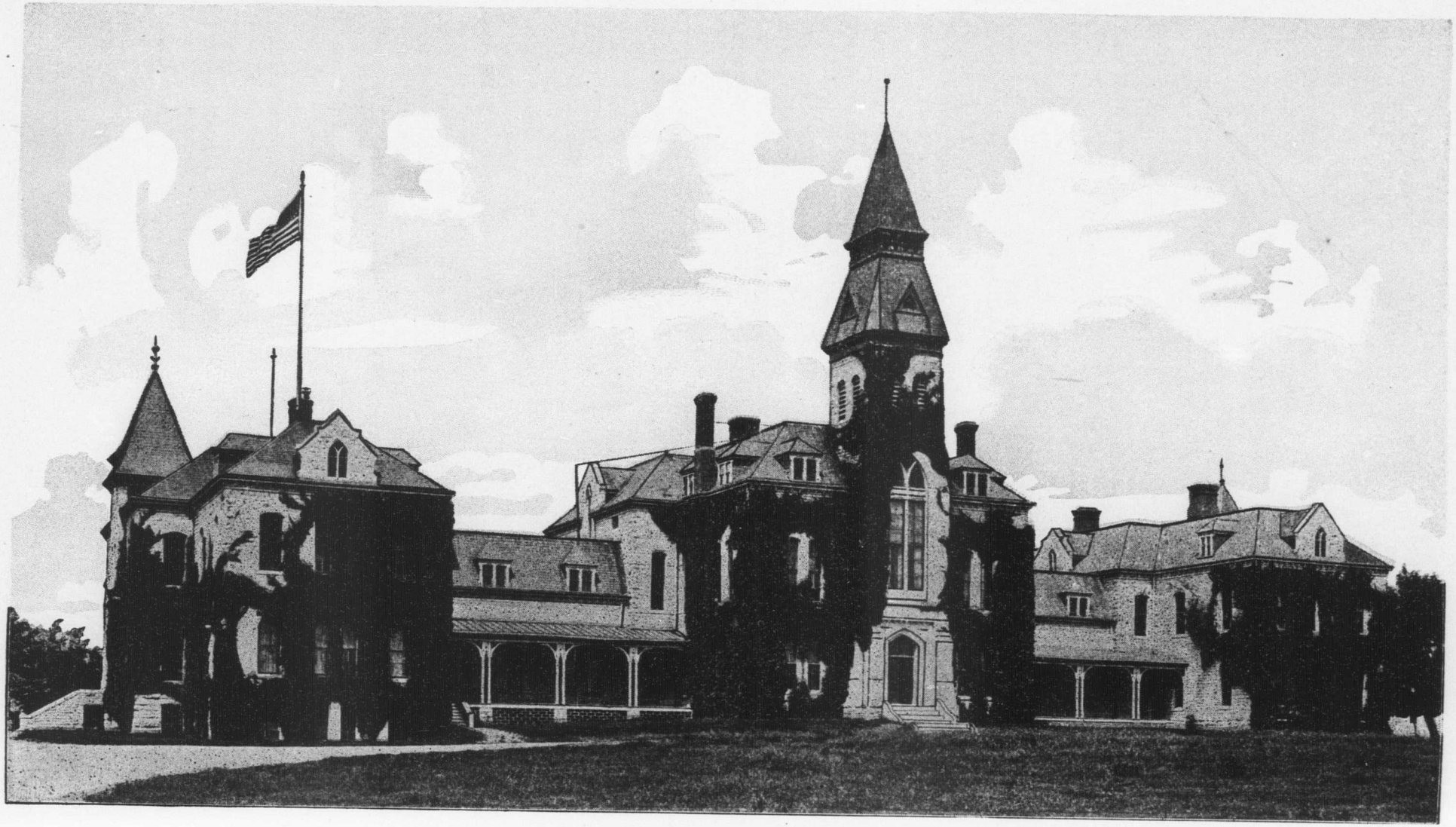

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THE INDUSTRIALIST.

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BLACKLEG VACCINE.

DURING the year 1901 the Veterinary Department made and distributed to stockmen, nearly all in the State of Kansas, three hundred twenty-five thousand doses of vaccine for the prevention of blackleg. A charge of one cent per dose was made to cover the cost of manufacture and distribution. During the present year the demand for vaccine has practically doubled and there will have been distributed during the year 1902 over a half million doses of vaccine. As no attempt is made to advertise the vaccine, the increased demand indicates how much it is appreciated by the stockmen of Kansas. There is probably more blackleg vaccine used, in proportion to the number of cattle raised, in Kansas than in any other state in the union. This not only indicates the value of the vaccine, but also that Kansas stockmen are up to the times and are quick to take advantage of the new scientific discoveries.

Blackleg is a serious disease of young cattle, caused by a germ. It attacks cattle ranging in age from suckling calves a few months old to three-year olds; very rarely animals older than three years. The most susceptible period is from six to eighteen months old. Comparatively few die after they are two and a half years old.

Blackleg vaccine is made by taking the bruised bloody-looking meat from an animal that has died from blackleg, cutting into thin strips, drying, and grinding into a fine powder. This powder is moistened and heated in an oven from six to seven hours. The higher the temperature the more the vaccine is weakened or attenuated.

Two kinds of vaccine are made—a single vaccine, that requires treating or vaccinating the cattle but once, and a double vaccine, which requires treating the animal twice, the first time with a very weak vaccine, which prepares the animal for the second vaccine ten days later, which is a much stronger vaccine than the

single. The double vaccine is recommended where it is practical to use it, as it is safer to use and gives greater protection or immunity. Among large herds, where it is impractical to handle the cattle twice, or in herds of cattle where blackleg already exists, the single vaccine is recommended. In nearly all cases where blackleg exists in a herd of cattle, vaccination has stopped the progress of the disease.

From statistics collected from stockmen using College vaccine it is found that vaccination reduces loss from blackleg from four per cent among unvaccinated cattle to one-fourth of one per cent where the double vaccine is used and to four-tenths of one per cent where the single vaccine is used. Taking these statistics as a basis (the bureau of animal industry, at Washington, estimates the loss among unvaccinated cattle in Kansas at four and seventy-six hundredths per cent), the use of three hundred twenty-five thousand doses of vaccine represents a saving of twelve thousand ten animals, which estimated at the low value of $15 each is a saving of $180,000 during the year.

Very few animals die as a direct result of the vaccine or improper methods of vaccinating, which is remarkable in view of the fact that nearly all are vaccinated by persons who have had no experience whatever. It is probable if the vaccination could be done by an expert that the per cent of loss could be greatly reduced.

The natural power of resistance or immunity to blackleg varies, not only in individual animals but in herds of animals and in different seasons of the year. Young cattle that are in excellent condition, or those that are gaining or losing flesh rapidly, seem most susceptible. For this reason young cattle that are to be kept in good condition or fed for "baby beef" should be vaccinated before being put on full feed, and if they are fed longer than four months they should be vaccinated again. Under ordinary conditions vaccination protects animals against blackleg for six months, but the younger the animal the less protection it seems to give. Calves vaccinated under six months should be revaccinated in three or four months, and all young stock should be revaccinated as yearlings. As a general rule it is a good practice to vaccinate young cattle twice a year, in the spring just before turning on pasture, and in the fall when first placed on dry feed. With plenty of assistance to drive the cattle into a chute that will hold from six to twelve at once, a person, after a little

practice, can vaccinate one hundred an hour easily. It is important in vaccinating that the vaccine should not be injected into the muscle or meat, but only into the loose connective tissue beneath the skin.

If it were not for the varying degrees of susceptibility which cattle have to blackleg it would be possible to prepare a vaccine that would be an absolute preventive against blackleg. As it is, cattle vary so much that the vaccine has to be made weak enough so it will not injure the weakest cattle. In making the College vaccine great care is used in its preparation, and every time a new batch of vaccine is prepared it is thoroughly tested upon a bunch of cattle before being distributed. N. S. MAYO.

REPORT OF THE PRESIDENT.

THE following extracts are from the thirteenth biennial report of the Regents and Faculty of the Kansas State Agricultural College.

Changes in Employees.—Of the large number of changes in the Faculty and assistants you are familiar. I trust that you will urge upon the legislature the necessity of a liberal appropriation, that you may pay such salaries as the importance of the work demands and stop our teachers from being drawn away by the offers of better salaries elsewhere.

Changes in the Course of Study.—Five years ago the course of study was divided into four courses—agriculture, mechanical engineering, domestic science, and general science. Three years ago these courses were revised, and a course in electrical engineering added. At the revision three years ago the courses were made alike the first year, except such differences as sex requires. Many young men undoubtedly go to college to learn something besides farming—they go to college prejudiced against farming. It was thought, by giving each young man one term of scientific agriculture in the first year, before the selection of a course need be made, that many would see some of the beauties and opportunities of farm life and would be led to select that course. The figures below bear out this conclusion. The increase of students from 1899 to 1902 was sixty per cent, while the increased number of young men taking agriculture during the same period was two hundred twenty per cent. Not only has the actual

number of young men taking the agriculture course greatly increased, but the strengthening of the agriculture course and the addition of agriculture to the first year's work has led to a much greater increase in the actual amount of agricultural work done. Many comments regarding the division of the courses were made at the time, many believing that the agriculture course would be neglected. The following table shows how the students have selected:

STUDENTS IN THE DIFFERENT COURSES.

Year.	Total.	Men.						Women.			
		Agriculture.		Engineering.		General Science.		General Science.		Domestic Science.	
		No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
1898–'99	870	127	22.1	160	27.8	287	50.1	193	65.4	103	34.6
1899–'00	1,094	257	34.1	201	26.7	296	39.1	170	50.0	170	50.0
1900–'01	1,321	378	39.6	293	30.7	284	29.7	109	29.8	257	70.2
1901–'02	1,396	407	40.0	367	36.1	243	23.9	83	21.9	296	78.1

In connection with the above, it should be noted that all young men have the same work during the first year, which includes one term each of agriculture, botany, physics, woodwork, blacksmithing and foundry work; and all young women take, during the first year, one term each of cooking, botany, and physics, and three terms of sewing.

If the number of students in each class in agriculture be multiplied by the number of hours the subject was taught, and the sum of all these products taken, the number thus obtained will tell better than any other method the actual work done in agriculture. The following figures were thus obtained:

Year.	Hours.
1896–'97	12,500
1897–'98	8,930
1898–'99	15,462
1899–'00	76,234
1900–'01	112,808
1901–'02	123,186

If all the subjects directly related to agriculture, such as horticulture, veterinary science, etc., had been included, the difference in favor of the last three years would have been still more marked.

The above figures show an increase of nearly seven hundred per cent for 1901–'02 over 1898–'99.

Large Classes.—The following table gives the number and size of classes during the last two years:

Term.	Number in class.						Total classes.
	1–10	11–20	21–30	31–40	41–50	Over 50.	
Fall, 1900	25	45	26	23	24	11	154
Winter, 1901	26	41	38	47	24	8	184
Spring, 1901	31	38	38	21	5	5	138
Fall, 1901	26	32	21	26	22	13	140
Winter, 1902	27	42	39	64	16	14	202
Spring, 1902	34	51	40	26	8	1	160
Total classes	169	249	202	207	99	52	978

Most institutions fix the maximum size of classes at thirty. There were three hundred fifty-eight classes having a membership of over thirty. In order to do the best work, the teaching force should be increased nearly fifty per cent. With the limited means, it has not been possible to increase the instructors as fast as the students have increased. The following table shows the enrolment, number of instructors, amount paid for salaries, and the amount paid for work in agriculture as compared with all other departments. The last two columns do not include salaries:

Year.	Students.	Instructors.	Salaries.	Department expenses.	
				Agriculture.	23 other departments.
1896-'97	734	33	$35,215	$ 2,098	$13,387
1897-'98	803	34	37,064	1,549	17,767
1898-'99	870	37	37,737	2,279	23,793
1899-'00	1,094	45	38,417	4,179	11,147
1900-'01	1,321	48	42,071	6,346	15,349
1901-'02	1,396	51	42,936	10,665	12,354

The amount available for department expenses for the three years 1896–'99 was $60,870, while for the three years 1899–'02 it was only $60,040, notwithstanding the number of students had increased sixty per cent in that time. It has been necessary to decrease the appropriations in all departments to give proper attention to agriculture, the growth in this department being shown in the previous part of this report.

Christian Associations.—The Young Men's and Young Women's Christian Associations have maintained large memberships throughout each year, rather more than half of the students being members of these organizations. They aid very materially in the welfare of the students, both morally and socially. They

hold weekly meetings, with joint monthly meetings, and give several entertainments during the year, the ones given at the beginning of each term being especially useful in bringing old and new students together. They have committees to meet all trains at the beginning of each term and aid students in finding rooms and boarding places, and in giving general directions. They also aid in the care of the sick when necessary.

General Duties.—Owing to the increased attendance and the consequent increase of executive work, as well as my necessary absence frequently from College, I have done no teaching. I have attended several meetings of the State Board of Education each year, prepared questions for the State and county examinations, and graded papers on the former. Several trips were made visiting various accredited colleges in the State.

There have been no serious cases of discipline. A few students were suspended for a short time on account of ten or more unexcused absences. The Faculty have felt that, since the State and nation furnish education here entirely free to all who apply, the students should be willing to attend regularly, unless absent for a good and sufficient reason. A few students were denied assignment for a half-term or a full term on account of failure in studies through lack of proper attention to duties. It is not the intention of the Faculty to deprive anyone of the privileges of the College who shows a willingness to attend classes and apply himself properly. The best of feeling has prevailed, and I have had the hearty coöperation of Faculty and students in all matters affecting the welfare of the College.

LARGER APPROPRIATIONS NEEDED.

THE increase in the last three years of sixty per cent in the enrolment of the State Agricultural College, bringing it up to thirteen hundred ninety-six last year, justifies the request of President Nichols for a considerable increase in the Faculty, and consequently in the biennial appropriation from the legislature.

Kansas has reached the point where all its educational interests, in fact, must receive more generous treatment at the hands of the legislature. Our Agricultural College is the largest, in point of attendance, in the country, a distinction on which the State may justly pride itself. It is probably too late now, considering the large investment in plants at both colleges, to follow the example

of Nebraska, Minnesota, Wisconsin, and other Western states, and consolidate the Agricultural College and the State University; and with two separate plants the aggregate cost must necessarily exceed that of the states mentioned. We have started on the plan of separate institutions and their increasing demands must be met. [Twenty-four of the agricultural colleges are associated with the state universities and twenty-four are separate.]

For both the Agricultural College and the State University there ought to be an endowment or annual income that will correspond to their growing enrolment, and they ought not to be required to haggle over the appropriations with successive legislatures. This means much larger sums for education than the State has been giving, but Kansas has been accumulating wealth, and a cheeseparing policy in doling out funds for its great institutions is not necessary, as in former years it has been. There are other places, as Governor Stanley pointed out last week, where economies can be more profitably effected. In educational work appropriations will have to be increased in a liberal way, or the colleges and schools will be unable to meet the demands upon them. This is a matter that the new legislature may be expected to deal with in a way that will put heart into the regents, officers, teachers and students.—*Topeka Daily Capital.*

MUSIC TEACHERS' NATIONAL ASSOCIATION.

THIS summer, in company with the other delegates from Kansas, Prof. A. B. Brown, of K. S. A. C, and Mrs. Cora E. Brown, I attended the annual meeting of the Music Teacher's National Association, which was held at Put-in-Bay, Ohio, July 1 to 5, in the Hotel Victory, a most delightful place to hold such a convention.

A great spirit of cordiality and sociability prevailed, due to the housing of all under one roof, and this surely is one great aim of such occasions, as at the end of each session or concert there was no dispersion to distant hotels or boarding-houses.

Put in-Bay is the name of a small island in Lake Erie, about forty miles from Toledo, sixty miles from Detroit, sixty-five miles from Cleveland, where the climate is unexcelled--"just far enough north, you know." It is one of the largest and most attractive of a group of islands in Lake Erie. There are five large hotels, an electric railway, many handsome summer cottages,

bathing beaches, interesting caves, etc. The absolutely pure air and water, bracing atmosphere, absence of dews or dust, have made it a popular summer resort throughout the West and South for years.

The Hotel Victory, where the Association met, is one of the largest and finest summer hotels in the world. It is situated on the highest point in Lake Erie, overlooking the site of Perry's naval victory in 1813—hence its name. Then the beautiful surroundings of Hotel Victory, the sylvan woodland near at hand, the handsome lawns, flower beds, fountains, the broad lake gleaming in the distance, rendered feasible the renewing of old friendships and the forming of new ones that would be almost impossible under other conditions.

The local conditions naturally precluded certain features which had been prominent at other meetings, such as orchestral and large choral concerts, organ recitals, etc., but there was so much to take their place that they were hardly missed.

The Hotel Victory band and orchestra, while not a part of the association program, were an enjoyable feature of the convention.

The "round table discussions and lectures" were so arranged as to interfere as little as possible with each other. The concerts, though somewhat limited in scope, were particularly interesting from their prevailing modern character. Very little of the classical school was heard—no Beethoven sonata nor Bach fugue, but to offset this there was no Listz rhapsodie. One gratifying feature of the program was the large number of American composers represented.

Pianists and vocalists naturally were in the majority; there was but little *ensemble* music, and more of it would have been appreciated.

The convention really started with a general meeting on the morning of the second day. Several memorial addresses were given, one of which was for Mr. J. H. Hahn, an ex-president of the association, who had died during the year.

After round tables devoted to public school music and organ playing, the association all reassembled in the main audience room to hear a piano recital by Paolo Gallico, of New York. He played with great breadth and fire, so characteristic of all Italians. In the afternoon there were more round tables for voice, theory, and piano playing.

At five o'clock came a unique event—the declamation of Tennyson's "Enoch Arden," with a musical background by Strauss, given by Miss Mary Miller Jones, reader, and Mrs. Murray, pianist, both of Philadelphia. The music was by no means continuous, but was used to heighten dramatic passages, sometimes with thrilling effect. There was great unity in the performance and all listened with utmost attention and interest.

In the evening a concert was given by part of the teaching staff of Oberlin College of Music. The highly artistic tone of this concert reflected great honor on the institution represented.

The next day was similar, except in detail, to the one just mentioned. The most interesting and instructive number given was a lecture, by Miss Fannie Edgar Thomas, of Boston, which bore the title of "A Dialogue." It proved to be an imaginary conversation, on advantages and disadvantages of foreign study for Americans. She handled her subject exceedingly well, and showed the folly of many Americans going abroad before they had any musical foundation on which to build an artistic finish, especially in voice culture.

Miss Thomas is well known to the musical world, she being the Paris correspondent to the *Musical Courier* for a period of seven years.

The evening concert was made up of Western composers' work, from St. Louis, Kansas City, Colorado, etc. After the concert the ladies of the committee gave a reception to officers and guests in the large corridor, which proved to be a most enjoyable occasion.

One of the most important things done by the association was a resolution passed, in which it was resolved to coöperate with the New England Educational League in an effort to have music and music study placed on a par with other branches of study in all colleges and universities. As soon as this is done, music will be where it rightfully belongs, and all educators will wonder why it was not done long ago.

Judging from what was said informally among the members, the next year's meeting at Asheville, N. C., will attract a large attendance from both North and South. The "land of the sky" and a warm southern welcome will no doubt be worth going quite a distance to experience.

R. H. BROWN.

THE INDUSTRIALIST.

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PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

Earl Trout, of Pratt county, is visiting his uncle, Supt. J. D. Rickman, and family.

Eureka lake skating parties are becoming popular among the students and assistants.

The Y. W. C. A. library has just received a valuable addition in the shape of a Bible encyclopedia.

During the past week the College had three delegations in the field attending farmers' institutes.

Miss Minerva Blachly, bookkeeper in the Secretary's office, has been sick since Tuesday of last week.

Prof. B. F. Eyer and family moved last week into the new cottage they have rented on Osage street.

The new press for the Printing Department will be received from the factory in New York about January 1.

The winter term will begin on Tuesday, January 6. Examinations for entering College will be held on Monday, January 5.

Will Wabnitz, who has been visiting with his brother, Louis Wabnitz, for the past month, returned Monday to Pueblo, Colo.

The engineering shops have done some difficult repairing on the cassions of the new Kansas river bridge three miles southwest of the College. The shops have also made a large number of hangers for the new Physical Science building.

Number four of the *Jayhawker* will be mailed during the present week. It will contain forty-eight pages of reading matter and a colored cover. From specimen pages which we have seen in the printing office, we can say that it will be a typographical beauty.

The well-known lecturer, Robert J. Burdette, lectured for the College lecture course association, last Friday night, in chapel. The attendance was all that the chapel could possibly hold, and the lecturer fully sustained his reputation as a funny man. His subject was "Rainbow Chasers."

The thirteenth biennial report of the Board of Regents and Faculty is being distributed by the Printing Department. It is a neat little volume of eighty-two pages, giving in a condensed form a resumé of the expenditures, financial condition and work of all the College officers and departments.

Mr. and Mrs. I. D. Graham, of Topeka, announce the engagement of their daughter, Agnes, to Bertram V. Kelley, of Kansas City, Mo , the wedding to take place some time this month.

The girls of the short course in domestic science invited their teachers to a dinner last Friday afternoon. About a dozen professors and assistants responded, and all report a good time.

The commencement exercises of the Manhattan city schools will be held at the opera-house on the evening of December 23. The class consists of twenty-seven pupils. Of these, eleven are boys and sixteen are girls.

The American Association for the Advancement of Science will meet in Washington, D. C., December 26 to January 4. A rate of one and one third fare for the round trip has been made by all railroads. From Chicago the fare will be $17.50.

The members of the committee on assignments are hard at work making assignments for next winter term. It is intended to assign every student before he leaves for the Christmas vacation, reserving for later action all cases that may require the results of the final examinations of the fall term.

The new addition to library hall will be furnished, heated and lighted by the beginning of the winter term. The radiators are already in place, the reading-room has been carpeted, the reading-tables are made and the remainder of the needed furniture has been ordered. The second floor will be occupied by the classes in zoölogy and bacteriology.

President Nichols has succeeded in getting reduced railroad fare for all students and College employes who wish to go home during the holidays. Tickets will be sold on December 19 and 20, good returning on or before January 5, at one and one-third fare. Students can obtain this reduction by getting a certificate of the Secretary, Miss Clemons.

Several boxes of glassware imported from Germany arrived for the Chemical Department last week. This is most of the supply for a year. The shipment includes some additional apparatus for advanced work and lecture room experiments, but for the most part consists of stock apparatus to supply the needs of the nearly three hundred students in chemistry which the department handles throughout the year.

The election of staff members and officers of the *Herald* organization was held a week ago. The only changes made in the personnel of the staff are F. C. Romig to the office of associate business manager and Jens Nygard to reporter. The literary, exchange and associate local editors, A. N. H. Beeman, J. J. Biddison, T. L. Pittman, respectively, were reëlected. E. C. Gardner was elected president, Miss Marian Allen vice-president, and C. H. White secretary of the association. An executive committee consisting of seven members was also chosen.

Theo. H. Scheffer, the new assistant in zoölogy, comes here from Cornell University. He was born in a little village, to fame unknown, among the hills of western Pennsylvania, at a very early age. When twelve years old he migrated dutifully with his parents to Minneapolis, Kan., which place has since been his home. He prepared for college at the Minneapolis high school, and after teaching one year in the district schools entered the University of Kansas. From this institution he was graduated with the class of '95, receiving the degree of Bachelor of Arts. In the fall of the same year he took charge of the Delphos high school. where he held forth more or less successfully until last spring. The summer of 1898 was spent at Cornell University. Mr. Scheffer went east again last June, taking a course in marine zoölogy at the Marine Biological Laboratory, Woods Holl, Mass., before taking up the work again at Cornell. At Thanksgiving time he completed the work prescribed for the A. M. degree and then came directly to Manhattan.

Under the heading "Keep it Going," Mr. W. E. Bromley, of Glen Elder, writes in the Beloit *Gazette:* "We have been holding institutes at Excelsior for three years, and the benefit which we have derived from them can hardly be estimated in dollars and cents. The professors sent by the Agricultural College to attend these meetings do not talk theory (as some people suppose), but they give us good, practical talks. Since we began this institute work, the farmers of this vicinity have simply been 'rushing to the front.' They are building cow barns and other stock shelters. They are getting a better class of stock. They are trying new kinds of grains and forage plants. In short, they are trying to farm in a practical manner, and not 'by guess.' One farmer has told me that the talk that A. G. Mead gave us on alfalfa was worth $25 to him. Prof. D. H. Otis has attended all of our meetings, and his talks are always good. The people of Kansas should be proud that we have Professor Otis at our Agricultural College. But why not have more institutes?"

Capt. A. S. Rowan, of the Nineteenth United States Infantry, the man who "carried the message to Garcia," and instructor in military science and tactics at the Agricultural College, went to Kansas City and opened the Lyceum lecture course for officers of the Third Regiment at Music hall last Monday night. The soldiers of the regiment marched from the armory to the hall in a body, under the command of Colonel Lechtman. Captain Rowan lectured on "Marches," and to assist him he used a large blackboard, on which were chalked the chart of important movements in the different marches upon which he placed special stress. The Lyceum course was instituted for the exclusive benefit of the regimental officers, but on account of the peculiar interest of Captain Rowan's subject it was decided to invite the enlisted men to attend Monday night. His lecture dealt with the duties of officers and soldiers when on the march, and contained a great deal of technical teaching of vast benefit to the soldier. When he mounted the platform he received a hearty welcome.—*Republic.*

State Senator Samuel J. Stewart [our Regent] and his brother, Watson Stewart, both of Iola, were caught in a railroad wreck while enroute to Washington a few days ago. Although two engines and a number of cars were smashed up and three people killed, Senator Stewart and his brother, fortunately, escaped without injury whatever. To-day the Senator received a tele gram from his son conveying the news that a two hundred fifty barrel per day oil well had been struck on his land in Allen county. He and his brother are here with a claim before congress.—*Washington news in Topeka Capital.*

The Chemical Department has completed the installation of a condenser for the preparation of distilled water. It was designed by Professor Willard, and constructed in part by the Mechanical Department, in part by P. W. Zeigler. It is furnished high pressure steam from the power boiler in the Heat and Power Department, and condenses it with great rapidity. Its capacity has not been exactly determined yet, but is several hundred gallons per day. It will supply an abundance of distilled water for the various departments of the College requiring it, and, if desired, for drinking also. As soon as funds are available, a storage tank will be provided from which water will be piped to the several laboratories of the department.

ALUMNI AND FORMER STUDENTS.

Miss Clara Spilman, '00, has been appointed to the position of teacher of domestic science in the Girls' Industrial School, at Beloit.

It is announced that David G. Fairchild, '88, will be married this winter to Miss Mildred Howells, a daughter of the novelist, W. D. Howells.

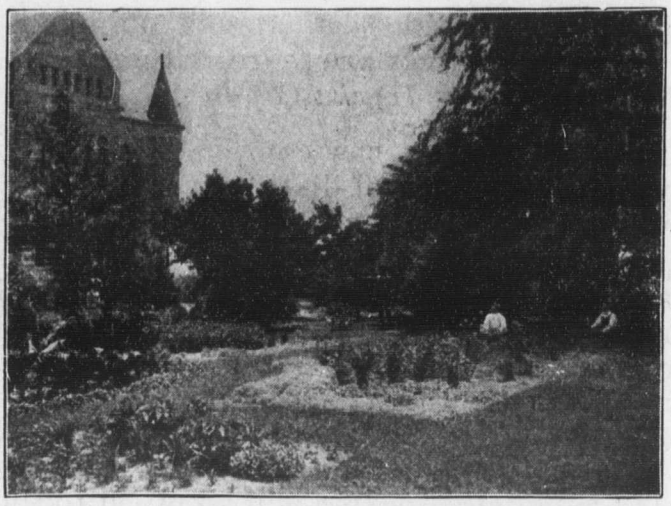
Z. L. Bliss, '00, recently made a hurried visit to the College. He is still in the bureau of forestry, and has been at work in the Wichita mountains of Oklahoma.

C. F. Doane, '96, is one of the authors of Bulletin No. 86 just issued by the Maryland Experiment Station. The subject is, "The Influence of Preservatives on the Food Value of Milk."

Invitations are out for the wedding of Miss Lorena Helder, '94, and T. W. Morse, '95; also for that of Miss Josephine Wilder, '98, and Dr. W. A. McCullough, '98. The former is set for the twenty-third instant and the latter for the twenty-fourth.

G. C. Wheeler, '95, is completing arrangements for taking a position as manager of the Waldron farms, in Harper county. These farms include some twelve thousand acres, and their proprietor, an enterprising and progressive young man, desires to have his tenants profit by the presence of a thoroughly trained scientific manager, and we predict that in Mr. Wheeler he has found a man whom it would be hard to excel.

KANSAS STATE AGRICULTURAL COLLEGE



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THE INDUSTRIALIST.

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SLAVERY IN THE UNITED STATES.*

TO study and to understand this institution as it grew and flourished and went out is to study a large part of the history of this country. In this study it must be taken for granted that the owners of slaves were sincere in the belief that the condition of slavery was the best possible one for the black man. Some there were who would gladly have done away with it; but how was the perplexing question.

Our constitution is a compromise of many conflicting opinions and interests. Very naturally differences of construction arose as to the interpretation to be placed upon certain provisions of the instrument. The revolutionary fathers struggled no more earnestly for freedom and to form a new government than their descendants to carry out that form of government as they understood it.

This article is not intended to be exhaustive but a general guide in the study of a question so heavily fraught with difficulties, with dangers, with desolation, with woe. The statements here presented can all be verified and amplified by an examination of the books in the library.

The arrangement, in columns, of the dates of admission of certain states, free or slave, is believed to be advantageous for reference. At the time of the Declaration of Independence all of the original colonies had slaves. Only one at the adoption of the constitution had abolished the institution. Besides Massachusetts, six others are placed in the column of free states because slavery was, for many reasons, not profitable and they voluntarily abolished it.

Introduction of Slavery, 1619.

Read the proposed ordinance of 1784, introduced into the Continental Congress by Jefferson.

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*For classes in the Preparatory Department. This article is intended especially for those studying United States history.

Ordinance of 1787.

The territory over which this ordinance extended should be well fixed in the student's mind. The ordinance itself should be carefully studied, not only with reference to slavery but to educational matters.

Constitution of the United States, 1789.

Original States.

Free.	*Slave.*
Massachusetts.	Delaware.
New Hampshire.	Maryland.
Rhode Island.	Virginia.
Connecticut.	North Carolina.
New York.	South Carolina.
New Jersey.	Georgia.
Pennsylvania.	.....
Total 7.	Total 6.

The number of slaves during the revolutionary war is not known, but from the census of 1790 it has been estimated that the number of slaves in the so-called free states was about forty thousand and in the slave states a little more than six hundred fifty-seven thousand.

States not Original with Date of Admission.

Vermont, 1791.	.....
.....	Kentucky, 1793.

Invention of the Cotton Gin, 1793.

The effect of this invention upon cotton production was wonderful. Examine in what way.

.....	Tennessee, 1796.

The states free and slave are now equal.

The Alien and Sedition Laws, 1798.

These laws, though limited in time by the laws themselves, had their natural and logical answer in

The Virginia Resolutions, 1798.

The Kentucky Resolutions, 1799.

The Virginia Resolutions, among other things, say the government is a "compact" of States, and in case of a "deliberate, palpable and dangerous exercise of other powers not granted by the compact, the states . . . have the right and are in duty bound to interpose," etc.

The Kentucky Resolutions go farther and say such "acts are . . . void, and of no force, and nullification is the rightful remedy."

Ohio, 1803.	.....

Louisiana Purchase, 1803.

Act of Congress Abolishing the Slave Trade, 1807.

.....	Louisiana, 1812.
Indiana, 1816.	.....
.....	Mississippi, 1817.
Illinois, 1818.	.....
.....	Alabama, 1819.
Maine, 1820.	.....
.....	Missouri, 1821.

Missouri Compromise, 1820.

Purchase of Florida, 1819-'21.

The Missouri Compromise made the Louisiana Purchase north of 36° 30′, except Missouri, free; south, slave.

Henry Clay was not the author of the Compromise, but its great advocate. The solution of the slave problem was believed to have been reached. The number of free and slave states are equal and the balance of power is preserved in the senate.

Tariff of 1828.

South Carolina Nullification, 1832.

Here is the true ending of the Kentucky and Virginia Resolutions.

A life of Calhoun, the great apostle of Nullification, the Webster-Hayne debate, President Jackson's action in the matter, and what congress did relative to the tariff should here be read.

Texas, claimed by some to have been rightfully in the Louisiana Purchase, became independent in 1836. This was accomplished by men chiefly from the slave states.

.....	Arkansas, 1836.
Michigan, 1837.	.....
.....	Florida, 1845.
.....	Texas, 1845.

Mexican War, 1846-'48.

Wilmot Proviso, 1846.

Iowa, 1846.	.....
Wisconsin, 1848.	.....

The number of free and slave states are again equal.

The large accession of territory from Mexico and the discovery of gold in California in 1849 brought the admission of

California, 1850. .....

Compromise of 1850.

Study carefully the provisions of this compromise.

That portion of the Compromise concerning the return of fugitive slaves was exceedingly distasteful to many free states and "personal liberty" laws were enacted by some of them.

Here should be read Webster's seventh of March speech, Calhoun's and also Steward's.

The free now outnumbered the slave states by only one, but the following table of the percentage of population computed from data in the United States census showed wherein the real danger lay:

Year.	*Free States.*	*Slave States.*
1790	50.0 plus per cent.	49.9 plus per cent.
1800	50.5 plus per cent.	49.4 plus per cent.
1810	51.9 plus per cent.	48.0 plus per cent.
1820	53.4 plus per cent.	46.5 plus per cent.
1830	54.5 plus per cent.	45.4 plus per cent.
1840	57.0 plus per cent.	42.9 plus per cent.
1850	58.4 plus per cent.	41.5 plus per cent.

Only three-fifths of the slaves were counted for representation, and the percentages clearly show the slow but sure preponderance of the free states in the house of representatives.

At this point it is well to trace the abolition societies from 1830 forward and the bitter opposition they aroused among slave holders. Read the story of Garrison, Phillips, Lund, and Lovejoy. Examine the life of John Quincy Adams, with especial reference to his long contest against the "gag policy" of the house of representatives, and the effort to prevent the sending of abolition papers through the mails. Read Uncle Tom's Cabin.

The tension of the states was now becoming very great. By 1852 the great triumvirate, Calhoun, Clay, and Webster, was gone and new men took their places. Stephen A. Douglas, failing to secure the nomination for the presidency in 1852, and either not perceiving or not understanding the growing northern sentiment against the extension of slavery (perhaps having an eye on the nomination for 1856), introduced and secured the adoption of the

Kansas-Nebraska Act, 1854.

This was the beginning of the end. Read the story of Kansas. Much literature on this period can be found in the library.

The following indicates the anti-slavery political growth:

Year.	*Party.*	*Presidential Vote.*
1840.....	Liberty.....	7,059.
1844.....	Liberty.....	62,300.
1848.....	Free Soil.....	291,263.
1852.....	Free Soil.....	156,149.
1856.....	Republican.....	1,341,264.

The Kansas-Nebraska Act had consolidated northern opposition to the extension of slavery.

Mr. Buchanan, in his inaugural, March 4, 1857, intimated what a supreme court decision would be. This decision was promulgated two days later. This was

"The Dred Scott Case," 1857.

This decided a negro was not a citizen and therefore could not sue. If that were so, then the decision should have ended there. But the court, a divided one, went on and decided things not before it. Perhaps it was done with a fond hope that quiet, on the slave issue, might be brought the country. It had the opposite effect.

Lincoln-Douglas Debates, 1858.

These debates cover the entire issue as then presented and should be carefully read if one wishes a clear idea of the matter in dispute. No such lucid, concise, logical reasoning upon a political subject appears anywhere else in the annals of history. W. H. Seward's irrepressible conflict speech, delivered in Rochester, N. Y., in 1858, numerous speeches in the senate by Wade, Chestnut, Yancey, Toombs, and others, about this time, indicate the gathering of the forces for the conflict.

Minnesota, 1858.	.....
Oregon, 1859.	.....

John Brown's Raid, 1859.

Lincoln's Cooper Institute speech, February, 1860, discusses the subject from a different standpoint.

Political Campaign, 1860.

The platforms, in reference to slavery, of the four parties of 1860 should be studied, especially those of the Republican and Breckinridge democracy, for they present the real issue at stake.

By 1860 the free outnumbered the slave states by three, and contained a little more than sixty per cent of the entire population. Mr. Lincoln was elected president in November, and in December, nearly three months before his inauguration, the slave states began to secede. They organized a government whose "corner-stone" was slavery. See speech of Alexander H. Stephens after he was elected vice-president of the Confederacy, delivered at Savannah, Ga.

The Civil War, 1861-'65.

War seemed to be the only way to settle the vexing issue. Read Lincoln's first inaugural address, his war measure proclamation freeing slaves in certain places, his second inaugural address.

Kansas was admitted in 1861, West Virginia and Nevada during the war.

Early in 1865 the Thirteenth Amendment to the Constitution was adopted by congress. (Most of its words are copied from the Ordinance of 1787, an ordinance written by Jefferson.) Before it could be declared a part of the Constitution it must be adopted by three-fourths of the state legislatures. Just the required number, twenty-seven, adopted it: but before the twenty-seventh adopted it (such is the perversity of human nature) the legislature of one state, being changed politically, withdrew its consent. But it was declared by proper authority that a state legislature might withhold its consent, but once given it could not be recalled. And so in December, 1865, the Thirteenth Amendment became a part of the fundamental law, and slavery was abolished.

B. S. McFARLAND.

The Topeka *Daily Capital* says of Professor Lantz's paper on "Birds" read before the State Horticultural Society: "D. E. Lantz, of the State Agricultural College, gave some statistics relative to the birds of Kansas. Mr. Lantz has a revised classfication of the birds of Kansas now in preparation, which will be furnished the State within the next year. He regards the classification of the birds of Kansas to be one of the most complete of any of the states. There are now three hundred fifty-six species classified, which is the greatest number of any state except Nebraska, and possibly California."

THE INDUSTRIALIST.

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Manhattan, Kansas.

PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

Assistants Alice Rupp and Hetty G. Evans spent a part of the holidays in Abilene.

The Agricultural College is crowded from the hatrack to the belfry.—*Nationalist.*

The carpenter-shop made one hundred new small drawing boards for the Department of Industrial Art, during vacation.

Prof. W. O. Clure and wife and Mr. Clure's sister, Miss Stella, spent part of the holidays at their old home, in Des Moines, Ia.

The Veterinary Department tested the College herd for tuberculosis during the holidays. Only one animal reacted to the tuberculin.

There will be a poultry institute at the Agricultural College sometime during the latter part of February. Details will be published next week.

Mrs. E. E. Winchip, of Peoria, Ill., formerly the teacher of sewing at this College, visited College, as the guest of Prof. D. H. Otis, during vacation.

Professor TenEyck's family arrived here last week from Fargo, N. D. They will make their home in the Ericson cottage, on Laramie and Tenth streets.

The assigners of first-year students ran short of assignment blanks on Tuesday and had to send a rush order to the printing-office for another hundred.

Dr. C. M. Brink occupied the pulpit of the Manhattan Congregational church last Sunday, and Dr. G. F. Weida preached in St. Luke's church, Wamego, Sunday a week ago.

Professor Eyer and family visited relatives in Hiawatha during the vacation. The professor attended the State Teachers' Association at Topeka before he returned to Manhattan.

Mr. Charles Hughes, private secretary to President Nichols, and Miss Maud Marine, of Randolph, Riley county, were married on New Year's day. The INDUSTRIALIST wishes the couple a joint life of perpetual sunshine and happiness.

The Library Department has just received an order of about fifty new books. The lot includes three new dictionaries—two Websters and a Standard—the writings of Senator John J. Ingalls, and four volumes of Law's Veterinary Medicine.

Professor McKeever, instructor of psychology in the State Agricultural College, delivered an excellent discourse in the Baptist church last Sunday morning.—*Wamego Times.*

Professor and Mrs. A. Dickens celebrated their fifth wedding anniversary on New Year's day, at their home on Manhattan avenue, by arranging a reunion of the Kimball family.

The Chemical Department used a part of the vacation for moving their mineral collection—the remnants saved from the fire four years ago—into new quarters in Physical Science Hall.

The gale on last Wednesday blew down one of the two new chimneys on the new dairy barn. The flues had just been completed a few days before and the mortar had not yet become hard.

Student Assistant R. A. Oakley, of the Botanical Department, has left for Chicago University to take up special work in botany and seed breeding. He will return in the spring and graduate with his class.

The Union Pacific Railroad Company is building a standard sheep chute at their stock yards east of town. This is a much needed improvement and will add greatly to the sheep shipping facilities of this vicinity.

The Department of Industrial Art has organized twenty different classes for the winter term. Professor Walters will be assisted in his work by Miss Hetty G. Evans and Miss Ella Weeks. The total number of students enroled by the department is over four hundred.

The Library Department is snugly housed in its new addition. The reading-room looks bright and light, the tables and chairs are neat and comfortable, though they are made of cheap material, and the floor carpet is noiseless. The increase in busy readers is quite noticeable.

J. G. Haney, superintendent of the Hays Branch Experiment Station of the Kansas State Agricultural College, will read a paper at the annual meeting of the Kansas Improved Stock-breeders' Association, on "Our Four-Thousand-Acre Experiment Farm and Its Possibilities."

Prof. Charles Georgeson, formerly the professor of agriculture at this College, visited his old friends about College, on January 3, while enroute from Portland, Ore., to Washington, D C. The professor looks bright and hardy and seems to enjoy his life as government expert in Alaska.

This number of the INDUSTRIALIST has the honor of being the first one printed on our new Babcock "Optimus" press ordered by Superintendent Rickman several months ago and received last week. The press is a beautiful piece of machinery, able to do first-class work at good speed. A description of it will be given in a later issue.

Professor Clure "traded" rooms with Assistant Professor Harper during the vacation. The old organ and the two pianos stationed in the old bookstore room had interfered with the afternoon private rehearsals of the Oratory Department, making the change of recitation rooms imperative.

The new dairy barn is completed, the iron stalls are inserted, the overhead tracks are in place, the cattle are transferred into their new quarters and the dairy implements are being moved into the new dairy rooms. The whole building is a model of modern farm architecture and well worth a visit by dairy men and lovers of perfect dairy arrangements.

The Kansas Stock Breeders' Association, to be held at Topeka, January 12 to 14, has prepared an interesting program. The following subjects will be presented by the Faculty of the Agricultural College: "Feeding Dairy Cows," Prof. Ed. H. Webster; "Injurious Foods for Stock," Dr. N. S. Mayo; and "Results of Feeding Swine at the Kansas Experiment Station," Prof. D. H. Otis.

Died, at her home on Vattier street, Manhattan, Kan., on Thursday, January 8, of hemorrhage of the lungs, Miss Laura Belle Ware, third-year student of 1902. Miss Ware was a fine and bright looking young woman, of excellent character and lovable disposition, who had many friends among College mates and teachers. Her remains were laid to rest in the Manhattan cemetery.

Professor Edith McIntyre received the Faculty and their wives and a few invited guests Friday evening from 8 to 11 in Domestic Science Hall to meet the Board of Regents. The rooms of the main floor were tastefully decorated, a select musical program was presented by students under the direction of Professor Brown, and light refreshments were served to the guests. All report the reception a success in every particular.

Now that J. G. Haney, superintendent of the Hays Branch of the Kansas Experiment Station, has taken unto himself a wife, his cordial invitation, contained in a recent letter, to visit him and inspect the Station, is given an added force, which will prove practically irresistable. The associate editor numbers Mr. Haney and his wife among his personal friends, and shall be glad to accept the invitation on their account, as well as in the interests of the development of this great Station in the West.—*I. D. Graham, in the Kansas Farmer.*

Another of the foremost educators of the State stolen from us. This time by Leland Stanford University from K. U. Dr. C. E. Franklin, professor of physical chemistry, was worth more to the big California school than Kansas paid, and he has gone. The Agricultural College is unfortunate in this respect also. In the past two years, according to Pres. E. R. Nichols, thirteen of the ablest instructors of the institution have resigned to accept positions at higher salary. Cannot something be done to stop this drain on the brains of the State.—*Gridley Star.*

The Horticultural Department is indebted to Mr. J. Stegmeire, of Etiwanda, Cal., for a very liberal donation of samples of the various grades of Muscat and Sultana raisins. These and the oranges, lemons and olives sent by Isaac Jones, '94, created some California enthusiasm in the pomology class.

Prof. W. L. Hofer, of Manhattan, formerly of the chair of music at this College, has composed a very fine two-four time b-flat intermezzo, "Cleopatra," for the piano and the full orchestra. The piece was given by the Sousa Orchestra at the Topeka opera-house and greatly pleased the audience and the director. It forms Op. 14 of Hofer's musical compositions and promises to become as popular as his "Tarantelle Burlesque," of which several thousand copies were sold last year.

The following is a list and dates of farmers' institutes which will be held in various parts of the State, and the speakers who will give addresses: January 13 to 16, Hiawatha; January 14 and 15, Oneida; January 16 and 17, Seneca—speakers, Miss Edith McIntyre and Prof. H. F. Roberts. January 19, Smith Center; January 21 and 22, Stockton; January 23, Cawker City; January 24, Clyde—speakers, Prof. E. A. Popenoe and Prof. J. T. Willard. February 3 and 4, Wellsville—speakers, Miss Edith McIntyre and Dr. S. N. Mayo. February 5 and 6, Berryton—speakers, Dr. N. S. Mayo and Geo. A. Dean.

The Board of Regents met last week at the College in regular quarterly session and passed upon the usual routine work of the winter term. Among the items of the docket that were passed upon the following are of general interest: Assistant J. O. Hamilton, of the Physics Department, was made assistant professor of physics, and Chas. E. Paul, a graduate of the Worcester Polytechnic, was elected assistant in mechanical engineering. The Department of Animal Husbandry was authorized to purchase three bulls—a Hereford, a Shorthorn, and a Holstein. The Board also apportioned the funds of the former Agricultural Department among the newly organized Departments of Agriculture, Animal Husbandry, and Dairying.

The *Nationalist* publishes a list of building improvements made in Manhattan during the past year. On a low estimate the city must have built or enlarged a hundred houses, and these, including the new Union Pacific depot and the new College buildings, must have cost about a quarter of a million dollars. The city has also built several blocks of cement walk, about two and three-fourths miles of brick walk, and several extensions of the city waterworks. Many new dwellings and a fine city hall are in process of erection, and altogether the past year came very close to developing a genuine boom. Manhattan used to be known as a slow town, but the following figures show that the population is growing. Exclusive of the College and its hosts of students, the city census gives the following population on March 1 of each year: 1898, 2925; 1899, 3076; 1900, 3215; 1901, 3827; 1902, 4044. It is believed that the present population is about 4350.

The Agricultural College was well represented at the different meetings held at Topeka during the New Year's week. President Nichols gave an address before the State Teachers' Association on "Industrial Phases of Common-School Work;" Professors Willard and Lantz read papers before the Kansas Academy of Science, and Professors Popenoe, Dickens, and Roberts read papers before the State Horticultural Society, while a large number of professors, assistants and students attended the various sessions and lectures. All report a profitable time and many pleasant meetings with former students or teachers.

Dr. N. S. Mayo, State veterinarian, came up from Manhattan last Saturday morning in response to a communication from F. S. Rockefeller, who is again losing cattle. It will be remembered that Mr. Rockefeller lost several head of steers last fall from a disease supposed to be hydrophobia. At that time Dr. Mayo was called up, but then no cattle were sick. The disease abated until last week. Dr. Mayo went out to the Rockefeller ranch Saturday and found, as he had anticipated from previous descriptions of the disease, that it is undoubtedly hydrophobia. Two animals have died since the last outbreak and one was killed while the doctor was on the ranch. The worst feature about this case is that nothing can be done to prevent the disease. Dr. Mayo came back to Russell Saturday evening and was compelled to remain here until Sunday evening on account of the belated east bound trains.—*Russell Reformer.*

ALUMNI AND FORMER STUDENTS.

T. E. Lyon, '93, now a lawyer in Springfield, Ill., was in town during the holidays.

Mr. and Mrs. Geo. K. Thompson, '93, are happy in the birth of a son, December 21.

S. N. Chaffee, '91, left Sunday for Louisville, Ky., where he will attend a medical school.

O. I. Purdy, '99, has taken charge of the city circulation of the Anadarko (Okla.) *Daily Tribune.*

Joe Thoburn, K. S. A. C. '93, has been appointed secretary of agriculture of the territory of Oklahoma.—*Nationalist.*

M. S. Cole, '02, visited the College during the holidays. He is going to San Bernardino, Cal., to enter the Santa Fe shops there as a special apprentice.

C. H. Stokely, '97, was married Wednesday, January 7, to Miss Mabel Alice King, at De Queen, Ark. Miss King is a niece of Mr. and Mrs. Henry Knowles.

We are glad to learn that Phil Fox ['97] has taken his position in the world by entering the Yerkes Observatory, at Chicago. We expect great things of him.—*Mercury.*

R. Faris, '01, draftsman for Western Cartridge Company, East Alton, Ill., spent part of his vacation in Manhattan, and at College.

R. S. Kellogg, '96, of the bureau of forestry, contributes an interesting article on "Forest Conditions in Southern Arizona," to the December number of *Forestry and Irrigation.*

Mr. L. P. Brous, '86, was married December 31, 1902, to Miss Stella McCamish, of Kansas City, Kan. They will be at home after February 1 in Mexico City, Mexico, where Mr. Brous is employed as an architect.

Leroy Rigg, '01, and Miss Leora Kendall were married at the home of the bride's parents, Marvin, Kan., December 25. Mr. Rigg is in the farming and stock raising business on the farm, near Marvin.—*Students' Herald.*

C. V. Holsinger, '95, and C. A. Chandler, '00, were members of the committee on resolutions at the recent meeting of the State Horticultural Society. The good words and wishes for our Horticultural Department show their loyalty and appreciation.

Miss Marie Senn, '90, and Thomas B. Heath, of Seattle, Wash., were married on New Year's day at the home of the bride's parents, at Lasita, Kan. They will make Seattle their home, where Mr. Heath has a position as an electrical engineer.—*Students' Herald.*

E. M. Paddleford, '89, and Louise Reed-Paddleford, '91, spent a few hours at the College on the 23d ult. and were very much interested in the new buildings. Mr. Paddleford is preaching in Birmingham, Kan., and they were on the way to home-folks to spend the holidays.

Dr. C. S. Evans, '96, writes that he has located at Grand Encampment, Wyo. Doctor Evans is enthusiastic over the prospects of this mining camp, which is located fifty miles from the railroad and twelve miles from the Colorado line. His letter head shows him to be superintendent of the Good Shepherd Hospital.

The College family has suffered another loss in the death of Miss Grace Secrest, '96, December 15. She, with her cousin, Miss Birdie Secrest, '92, was attending Teachers' College, New York, and was apparently in her usual health. Her cousin left her at her room, and after missing her at classes later, called to see if anything was amiss and found her on the floor, where she had fallen from a stroke of paralysis. She was given the best medical treatment that could be had, but never regained consciousness. She was buried at Randolph. Death, which often comes as a liberator to one whose work is done, and in whom the pains of the body have become heavy, can never seem anything but an affliction when it takes the young and capable, who are just beginning the duties of life. May the Secrest family, so many of whom belong to the College circle, feel the sympathy that goes out to them in this second great bereavement.

J. G. Haney and Anna L. Streeter, both of the class of '99, were married Christmas day at the residence of the bride's aunt, Mrs. Geo. Moses, in Junction City. Only a few guests were present, relatives and near friends. The young couple took the afternoon train to Hays and went at once to their residence on the Fort Hays Branch Experiment Station grounds. Here they are as pleasantly situated as could be expected on a new place and will give a hearty welcome to all College visitors. The good wishes of many friends accompany them.

A very pretty home wedding was that of Miss Sue Long ['96] and Mr. Lou E. Strauss, which occurred Wednesday afternoon at 2:30 o'clock. The Long home was beautifully decorated in holly appropriate to the season. Doctor Hood performed the ceremony. Miss Long, through her connection with Manhattan papers, has made an unusually wide circle of friends, who wish her much joy in her new home, while regretting to have her remove from this city. She will, however, be welcomed to her new home in Topeka by other friends whom she has made during the past few months while acting as society editor of the Topeka *Herald.* Mr. Strauss is one of Topeka's vigorous young business men, highly respected by all who know him.—*Nationalist.*

Commissioner Homer Folks, of the department of charities, has found it necessary to cut down expenses in all the institutions under his control on account of the high prices of meat, and on that account a diet largely vegetarian is now being prescribed for all the city's charity wards. Miss Florence Corbett, dietitian at the Kings County Hospital and Almshouse, has been transferred to the central office of the department to act as general advisor. She will be consulted in all matters pertaining to the purchase, distribution, cooking and serving of food in all institutions of the department. Miss Corbett, who receives a salary of $1,000 a year, is a graduate of the Kansas State Agricultural College ['95] and has been chairman of the committee on diet for the National Household Economics Association.—*New York Sun,* December 16, 1902, through *Nationalist.*

Henry Augustus Platt, '86, died Friday, January 2, 1903, at Phoenix, Ariz., of tuberculosis of the larynx. Such is the brief story of the end of a brave struggle, of several years' duration, against death in one of its most repellent forms. All that medical skill and changes of climate could do was of no avail. He leaves a wife and two children, and a large number of other near relatives. The students of earlier years will remember him well as of a singularly cheerful and buoyant temperament, the life of any company in which he found himself, and his early death will bring sadness to many who have not met him for years. His father was Prof. J. E. Platt, so long a member of the Faculty here, and Professor Cottrell was a cousin. Words can do but little for those bereft, but the sense of sympathy can do much, and the many friends will extend this to the family in overflowing measure, especially to his mother and wife.

A large company of friends and relatives gathered at the Methodist church Wednesday morning, December 24, to witness the marriage of Dr. W. A. M'Cullough, '98, and Miss Josephine Wilder, '98. The church was beautifully decorated with evergreen, potted plants and cut flowers. The impressive ceremony was performed by Rev. J. A. Swaney, of Seneca. After the wedding a reception was held in the church parlors. The couple left in the afternoon for a trip, and will be at home in Linwood after January 15, where Doctor M'Cullough is a practicing physician. Among the out of-town guests were Professor and Mrs. Sawdon, of Chicago, who were warmly greeted by many friends.

Crane & Co. have made several contributions to the Christmas trade this year, and among the books which have been brought out by the Topeka firm, one of the most attractive is the pamphlet of poems entitled "Twilight Reveries," by B. H. Pugh ['92], a well-known business man of Topeka. Mr. Pugh has never before published any of his poems, but the volume which has just been put on the market contains some veritable gems. The first few poems in the book are pretty and attractive, and his "The Kansas Man," has caught the true Jayhawker spirit. The little poem on "Ruskin," and the gem which is entitled "Who's Most Thankful?" are very attractive, but the best thing in the book is the long poem, occupying a quarter of the thirty-page pamphlet, entitled "Man the Life Boat!" In this there is a fine description of a storm, which, developed artistically from a soothing and beautiful description of a balmy summer day, comes as the climax of a well built-up procession of stirring descriptions. The last poem in the book, "The Invisible Kingdom," is a beautiful bit of fanciful writing, and adds an artistic conclusion to the whole.—*Topeka Herald.*

On Tuesday evening, at the home of the bride's parents, 429 Colorado street, occurred a pretty wedding ceremony, solemnizing the marriage of Miss Lorena Helder and Theodore W. Morse. Dr. John Hood officiated, followed with a reading by Miss Katrine Krudop. The happy couple entered the room during the rendition of Lohengren's wedding march by Browns' trio and stood under a bower of ferns and mistletoe. The bride was handsomely gowned in white batiste en train with lace garniture, and carried American Beauty roses. The house was beautifully decorated with holly, ferns, palms, potted plants, mistletoe and cut flowers. About fifty guests were present. Mr. and Mrs. Morse left Wednesday morning for Mound City, where they will make a few days' visit at the home of the groom. They have secured rooms of Mrs. N. E. Lewis, near the corner of Osage and fifth, where they will be at home to their friends after January 10. The bride is a highly accomplished young lady, having graduated in the Leavenworth musical conservatory, the Copley musical conservatory at Boston, and at the K. S. A. C. in '94. Mr. Morse graduated from the K. S. A. C. in '95 and is a wide awake and successful young man. He is soliciting editor for the *Live Stock Indicator.*—*Nationalist.*

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GEORGE F. WEIDA, Ph.D. (Johns Hopkins) ..... Assistant Professor of Chemistry
CLARENCE L. BARNES, D.V.M. (Cornell University) ..... Asst. Professor of Veterinary Science

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Robert H. Brown, B.M. (Kan. Con. of Music), B.S. (K.S.A.C.) ..... Assistant in Music
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Miss Minerva Blachly, B.S. (K.S.A.C.) ..... Bookkeeper
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THE INDUSTRIALIST.

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THE ESSENTIAL ELEMENT OF HUMOR.

A FEW years ago Edmund Clarence Stedman delivered, at Johns Hopkins University, a series of brilliant and scholarly lectures on "The Nature and Elements of Poetry." Those lectures, since published for wider circulation, must have impressed every hearer with the thought that to define poetry requires almost as much genius as to make poetry. They certainly demonstrated the fact that it is much easier to tell what is poetry than to tell what poetry is.

There is about all poetry somewhat of mystery—a haze, which dims the sharpness of the outlines; makes the colors seem to blend and waver like the changing splendors of the twilight sky; casts, as it were, a halo over the ideas set forth, such as would not arise from the mere intellectual presentation of the thought. But not everyone that recognizes the mystery is able to explain or describe it. Many a man sees the haze and halo that glorify all true poetry, and his soul is responsive "unto the heavenly vision," who, nevertheless, is himself not only without the divine gift of poetry, but who is, also, utterly unable to explain why any given production is a poem.

In this particular there is an analogy between poetry and humor. Man has been defined as a laughing animal, but the definition is not very illuminating. Why does he laugh? "That is the question;" and, like many another question, it is easier to ask than to answer. In other words, to recognize the presence of humor is a much lighter task than to expound the philosophy of humor. The analogy, however, is one of kind rather than of degree; for the essential element of humor is not, as in poetry, either so elusive as to be difficult of discovery, so abstruse as to be hard of comprehension, or so indefinite as to be almost incapable of explanation.

In general, to say that anything is amusing is to say, for one thing, that it is out of fashion. A customary situation is not a

humorous situation. Why do we feel amused at seeing a very short man walking beside a very tall woman? Because it is not common. Why would it be laughable to harness the cart before the horse? Mainly because it is not the usual method. Why does it seem ridiculous to everybody but the victims of the mistake, when one sits down upon a new silk hat? Simply because the chief actor in the drama is not looking for such an interruption to his anticipated repose, and because that is not the ordinary way in which hats are worn. Why does the average small boy think it great sport to fasten a tin can to a dog's tail? He would not so think, perhaps, were it to become the can-ine fashion for dogs to be so adorned.

But another element is needed to insure the presence of humor. To be humorous, a situation must be not only out of fashion but out of fitness. We would laugh to see the cart before the horse, not simply because that would be an unusual method, but because it would also be an exceedingly inappropriate method of locomotion. Either the horse or everything else in the turnout would have to advance backward.

In the last analysis, therefore, the essence of all humor consists in the element of incongruity. When we are amused, in other words, it is because two or more objects of thought are brought into juxtaposition, which naturally are not to be united. They are "joined together" but do not become "one flesh." The unexpected has happened, and there is such manifest unfitness in the result as to excite our risibilities.

Numerous illustrations of this principle are to be found in De-Quincy. Take, for instance, his essay on "Murder Considered as one of the Fine Arts." The theme itself is so incongruous as to kindle a smile; and when the author proceeds, with an assumption of profound gravity, to discuss this theme, the smile flames into laughter. And this because he has united ideas, that the prejudices, or, if you prefer, the virtues, of our *blase* civilization have decreed should not be wed. When, for example, he wisely says: "The subject ought to be in good health; for it is absolutely barbarous to murder a sick person, who is usually quite unable to bear it," we are amused simply because of the grotesque incongruity of the ideas thus presented. Murder as a fine art is not in fashion, and to be seriously out of fashion is always, as we have seen, amusing.

A similar instance, but one that carried with it, when written, the sting of irony, is found in the following passage from Swift, where the humor is so broad as to become grotesque: "I have been assured by a very knowing American of my acquaintance in London that a young, healthy child is, at a year old, a most delicious, nourishing and wholesome food, whether stewed, baked, roasted, or boiled; and I make no doubt that it will equally serve as a fricassee or a ragout. . . . I grant this food will be most dear, and therefore very proper for landlords who, as they have devoured most of their parents, seem to have the best title to the children. Those who are more thrifty . . may flay the carcass, the skin of which will make admirable gloves for the ladies and summer boots for fine gentlemen. As for our city of Dublin, shambles may be appointed in the most convenient parts of it, and butchers, we may be assured, will not be wanting; although I rather recommend buying the children alive, then dressing them hot from the knife, as we do roasting pigs."

One is almost compelled to think that this was written for Americans, for it is difficult to conceive of Englishmen with enough sense of humor to appreciate the peculiar flavor of such a passage; and it is easy to imagine them as either horrified at Swift's shameless cannibalistic proposal for keeping down the population of Ireland or solemnly discussing the possible gustatory qualities of baby pot-pie.

Take another instance: When Mark Twain, in his "Innocents Abroad," relates with an appearance of sober sincerity how he found, among the rubbish of the arena in the Coliseum at Rome, a copy of the *Roman Daily Battle Ax*, which gave a full account, in modern newspaper phraseology, of a great gladiatorial exhibition, he furnishes an excellent example of the incongruity that lies at the basis of all humor. The account itself, of the bloody contests, a translation of which he professes to give, is likewise full of such inconsistent situations. I venture to mention one or two. After causing the *Daily Battle Ax* to praise the grace and skill of a young gladiator, who made his "first and only appearance" in these contests at the Coliseum, he represents the "sporting editor" of that enterprising journal as going on to say: "However, he was killed. His sisters, who were present, *expressed considerable regret.*" The account closes with an announcement, which would indicate that the *Roman Daily Battle Ax* approved of all efforts to furnish the

children with their share of innocent and instructive amusement: "A matinee for the little folks is promised for this afternoon, on which occasion several martyrs will be eaten by the tigers."

To say that all humor is based on the quality of incongruity is by no means equivalent to saying that all incongruity is humorous; for the incongruity may give rise to pathos or may result in tragedy instead of comedy. Much depends upon the point of view. The inharmonious situation, that is amusing to the spectator, may be very serious if not, indeed, tragic to the participant. Take, for example, another illustration from the "Innocents Abroad." It is the first day of the pilgrims' outward voyage. The sea is rough but, as it happens, the writer is not sick. He clasps a rail and hangs on, exhilarated by the bracing breezes and exulting in the unwonted vigor they impart. He thus relates his experience: "Soon a venerable fossil, shawled to the chin and bandaged like a mummy, appeared at the door of the after deck-house, and the next lurch of the ship shot him into my arms. I said: 'Good morning, sir; it is a fine day.' He put his hand on his stomach and said, '*Oh*, my!' and then staggered away and fell over the coop of a sky-light. . . . I stayed there and was bombarded with old gentlemen for an hour, perhaps; and all I got out of any of them was, '*Oh*, my!' I went away, then, in a thoughtful mood. I said, 'This is a good pleasure excursion. I like it. The passengers are not garrulous, but still they are sociable.'"

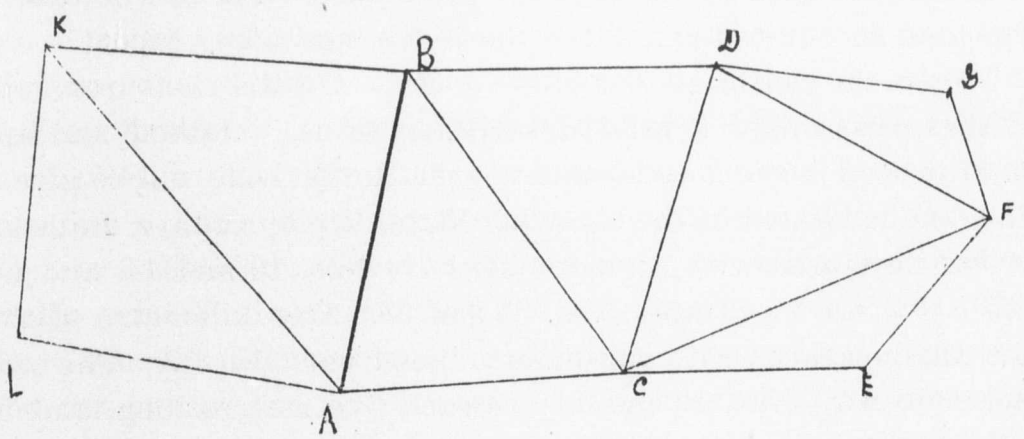
Now, the humor in this was, of course, dependent upon the point of view. Mark Twain thought it "a good pleasure excursion" because he was not seasick; but had he been compelled to exchange situations with one of the old gentlemen it would not have seemed so pleasant. In that case he would have been the one to cry, "*Oh*, my!" and would doubtless have felt like throwing up the whole expedition.

The quality of humor, in any given case, depends, of course, upon the nature of the incongruity underlying it; or, more precisely, upon the nature of the objects thus unequally yoked together. It may arise when dissimilar or contrasted ideas are brought into unexpected and inharmonious relation; when words are employed in an unusual sense; when things are put to extraordinary use; when persons attempt to act in spheres for which neither their experience, abilities, culture nor environment has fitted them.

CLARK M. BRINK.

THE TRIANGLE IN SURVEYING.

IN making an extensive survey of any tract the principles of the triangle are made use of, and for this reason the method is called triangulation. When the area under consideration is treated as a plane the problem becomes a simple one to those who are familiar with geometry and trigonometry. In ordinary surveying the earth is treated as a plane surface, and no appreciable error is committed in doing so on a limited area. Where extensive surveys are made and exact measurements required (as in geodetic survey) the earth's surface is no longer treated as a plane, but as an oblate spheroid, and the triangle considered is then the spherical. For plane surveying, the following problem will make the method evident.



Suppose a certain valley is to be surveyed, in which the width, length, area and topographical features are desired. A base line would be measured with the utmost care on as level ground as could be found. In the figure, let AB be the base line. Triangulations stations would then be staked at suitable points, C, D, E, F and G on one side and K and L on the other. With a transit the angles of each of the triangles would then be measured and corrected so that sum of angles of each triangle would be two right angles. With these data the length of the sides of the triangles may be computed by use of simple formulae from trigonometry. In the figure we have given the side AB and all the angles of the triangle ABC. Our formulae then is sin *BAC*: sin BCA = BC : AB. This gives us a new base, BC, and having all the angles of triangle, BCD, BD and CD may be computed, and so the chain of triangles may be extended indefinitely in all directions. The area of each triangle may be found by the formulae area of

triangle ABC=½AB×BC sin ABC. The topographical features are filled in by making measurements of intervening points with the stadia.

One of the most extensive applications of triangulation ever undertaken was that of measuring the length of a parallel of latitude across the United States by the United States coast and geodetic survey. It extends along the thirty-ninth parallel from Cape May, Maryland, latitude 38° 57′.3, to Point Arena lighthouse, California, latitude 38° 55′.9. The total length is about 2655 miles. The work was commenced in 1871 and ended in 1897. "The total cost, exclusive of salaries of officials, was $500,000." See report of United States coast and geodetic survey for 1900, page 23. Ten base lines were measured for the survey. To give an account of each would be out of place here. Those who desire a general account may find it in the above-mentioned report.

To give the reader an idea of the accuracy of the measurements of these base lines a brief description of the method and apparatus used in the measurement of the Holton base will be given. This line is located in the Crawfish Flats, Ripley county, Indiana. It was measured with contact-slide bars Nos. 13 and 14, and by two 100-metre steel tapes Nos. 85 and 88. One kilometre of the line was measured with a five-metre "iced bar" No. 17. The contact-slide bars Nos. 13 and 14 are each five metres long, and in making the measurements they were placed end to end and carefully aligned with a theodolite and leveled with a spirit level. The contact was observed with a micrometer. The measurement occupied several days. The line was measured forward and back and bars interchanged.

The "iced bar" No. 17 consists of an iron bar five metres long, made of tire iron, carefully placed in a Y-shaped trough and surrounded with finely crushed ice. The end points are marked by two platinum-iridium plugs set in the bar and lines ruled across their tops. Two of these lines are longitudinal and one transverse with the bar. Similar plugs of German silver are placed at intervals of 495 MM, and one line ruled across their tops longitudinal with the bar. The length of line measured was then defined as the distance between the two end plugs when the ruled lines were all in the same plane and in the same straight line. To bring the plugs into the same plane a striding level was used, and to bring the ruled lines into alignment a fine thread was

stretched across the end plugs and the intervening lines were brought into line with the thread by means of capstain head screws placed on opposite sides of each and in such a way that they would not pinch the bar. The whole apparatus is mounted on a truck, by which it is moved forward as the work progresses. The track on which this truck moves is made up of sections which are moved forward as fast as needed.

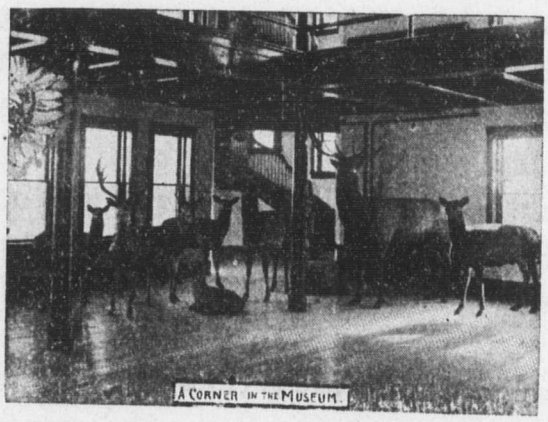
Since the total length of the bar is about five metres, it becomes necessary to make accurate markings of the end points. To secure this a row of posts were set in the ground along the line at distances of five metres, and attachments made for mounting a micrometer. This was so constructed that the micrometer could be moved a distance, in either direction, of about five centimetres. The micrometers were provided with levels so that the line of sight could be kept perpendicular to the end of bar, and were so constructed that they would read to microns directly. The car on which the apparatus is mounted has a slide adjustment whereby the rear observer can bring the end line in exact bisection with the cross wires of the micrometer. When this has been done the front observer adjusts his to bisection and the two readings made simultaneously and the readings recorded. The two observers then exchange places and observations repeated. The car is then moved forward and observations repeated on second section, and so on for the entire length. To avoid the disturbing heat from the sun on the micrometer, umbrellas were placed over them. With this apparatus one kilometer of the Holton base was measured.

After the base had been measured with the contact-slide bars Nos. 13 and 14, it was measured with two one hundred metre tapes Nos. 85 and 88, the object being to determine the efficiency of these as a primary base apparatus. Before the measurement with the tape was made, posts at intervals of ten metres were set along the whole line, and wire nails driven into them to support the tape. The strain applied to the tape was measured with a spring balance reading to ounces. To guard against overstraining, safety links were made to each end which would separate under a pull of forty pounds. Temperature was measured with mercurial thermometer, one at the middle and two equally distant from the ends. To get the best results the measurements had to be made at night, when the temperature remained nearly con-

stant. A comparison of the measurement of the base with a tape and the contact slide bars Nos. 13 and 14 showed that the tape would give a probable error of 1:1,500,000 of the whole length of the base.

After the base line has been measured as above, its length must be reduced to that of the standard metre. This requires the apparatus used to be compared, and their length determined by the standard metre. For a detailed discussion of this the reader is referred to the report of United States coast and geodetic survey of 1892, part two. WM. ANDERSON.

In his annual address at the meeting of the Improved Stock Breeders' Association in Topeka this week, President Harrington says the following of the Agricultural College: "In this connection I want to impress upon you the importance of our State Agricultural College and the good work that its practical experiments are accomplishing for the farmers and stock breeders of the State. We need educated farmers, and the farmer's boy who expects to follow farming and stock raising as his life work needs a course at our State Agricultural College just as much as the boy who expects to be a lawyer or preacher needs a course of instruction at our State university. As farmers and stock raisers we are vitally interested in seeing our State Agricultural College the leader in every movement which has for its object better farmers and the improvement of our flocks and herds."



THE INDUSTRIALIST.

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Manhattan, Kansas.

PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

The Mechanical Department has just completed a new line shaft for the creamery room.

The Veterinary Department sent out two thousand doses of blackleg vaccine last Saturday.

The next annual meeting of the Kansas Academy of Science will be held at Manhattan, and at the Agricultural College.

Professor McKeever has an article on "The Psychological Factor in Teaching" in the December number of the *Teachers' World*, published in New York.

The basket-ball game played last Friday afternoon in the College barn between the Haskell Indians and the College team resulted in a decisive victory for the red-men.

The dairy short course this winter has a young woman member, Miss Hannah Worthington. Her teachers report that she is taking hold of the work in good earnest.

R. W. DeArmond, of the senior class, will finish his work here about the middle of the term and will go to Alaska, where he has a position as United States agriculturist.

The following society presidents have been elected for the winter term: Franklin, O. O. Scott; Alpha Beta, Emma Smith; Hamilton, J. M. Jones; Webster, Frank Boyd.

The Dairy Department is making about nine hundred pounds of butter per week. It is sold at a net price at the College of twenty-eight cents and goes mostly to New York.

Miss Josephine Berry, of Waterville, Kan., formerly librarian at the College, stopped off Tuesday for a short visit with Mrs. R. J. Young. Miss Berry was on her way to St. Louis.

Prof. E. E. Faville, formerly of our Horticultural Department, and later president of the Hebrew Agricultural School, at Philadelphia, has founded an agricultural paper, *Successful Farming*, at Des Moines, Iowa.

The biennial report of the State Live Stock Sanitary Board is being distributed. The main part of the pamphlet is devoted to the most common diseases affecting live stock, with methods of treatment and prevention, and is from the pen of Dr. N. S. Mayo, of this College.

Prof. E. A. Burnett, of the department of animal husbandry of the Nebraska Agricultural College, visited College on Saturday and spoke encouraging words to some of Professor Otis' classes.

The Riley County Educational Association met at Riley, Saturday, December 17. Of the ten papers and addresses presented nine were given by former students of the Agricultural College.

The Dairy Department has had eight class cases constructed for the safekeeping of the parts of the different hand separators that are used by the dairy classes. The cases were made in the carpenter shop.

The Dairy Department is conducting a test of the different hand separators in use at the dairy school for their capacity and skimming qualities. The results will be published in an Experiment Station bulletin.

The annual meeting of the State Dairy Association will again be held at the Agricultural College. It will convene on March 3 and last four days. The officials and the College are doing their best to insure a rich program.

President Nichols was at Topeka last week from Monday until Saturday, attending the meetings of the Kansas Improved Stock Breeders' Association, the State Board of Agriculture, and looking after the interests of the College at the state house.

The maximum record for high water in the history of Manhattan was made July 12 of this year. The Blue river was twenty and one half feet above low water mark, *i. e.*, nine inches higher than at any previous time since the arrival of the first white settlers, nearly fifty years ago.

One of the finest sights for visitors are the military drills on the College campus every morning before chapel. The cadet battalion is beginning to do very handsome maneuvering. Their movements and evolutions have the right military vim and snap and they never fail to draw favorable comments from the spectators.

Number IV of the society lecture course, a lecture entitled "Bed Rock in Anglo-Saxon Civilization," was given last Friday night by Gen. Z. T. Sweeney. The lecture was good and the chapel crowded to the last seat. The next number will be a concert by the Düring's Swedish Ladies' Quintet, on February 4. The course consists of eight numbers.

Judge Nicholson, of Council Grove, visited his son, who is a student here, last Wednesday. After looking over the College he called on the local editor and said that he was here several years ago, when he held a session of the Riley county district court for his colleague, Judge Spillman, of Manhattan, but that he was greatly surprised at the many evidences of growth in our institution.

Prof. John A. Craig, author of "Judging Live Stock," and who for several years was professor of animal husbandry at Wisconsin University, and later occupying the same chair at the Iowa Agricultural College, has been secured as instructor in judging beef cattle at the Kansas State Agricultural College during "beef" week, February 23 to 28, 1903. Kansas is to be congratulated on securing the services of such an able judge, and it is hoped that the breeders and feeders of beef cattle over the State will avail themselves of the opportunity of hearing and meeting him at the Agricultural College next February.

The attendance of the present term is far ahead of that of every preceding term in the history of the College. We are unable as yet to give the exact figures, but we know that there are over 1300 students on the ground. The regular four-year courses have been classified by the committee on assignments and we can give the following figures for these: Preparatory students 160, first years 512, second years 220, juniors 150, seniors 65. There are 13 special and 35 dairy students enrolled. The remainder are graduate students, short-course farmers and apprentices. The departments are taxed to the utmost to take care of this multitude; every classroom, laboratory and shop is crowded to its limits and less than half of the students are able to find seats at the morning chapel exercises. The College has asked the legislature for more buildings. We have done this before and have erected buildings nearly every year for years, but the thirst for education among the young farmers of the State is such that the attendance is increasing ahead of our ability to provide facilities.

Last Friday the College was visited by a delegation of about forty members of the legislature, who had come here on Thursday evening, piloted by Rep. Frank Emmons, of Riley county, and President Nichols. The delegation was present at the morning chapel exercises and from the rostrum feasted their eyes on the multitude of bright student faces present. The students had anticipated the coming of the delegation and crowded into chapel in full force. To say that the chapel was full is putting it mildly. They filled the seats, stood in the aisles, sat upon the edge of the rostrum, climbed upon the radiators and window benches, and looked over the transoms. The sight was a novel one to many of the visiting legislators and they expressed themselves without restraint. President Nichols called upon Representative Bevington of Jewell county, Senator Fitzpatrick of Chautauqua county, and Senator Branine of Harvey county, to speak to the students, and all three responded with short and bright addresses congratulating the students on their grand opportunities and promising them their unqualified assistance in obtaining the needed State appropriations for the next two years. Representative Bevington stated that he had been a student here over twenty years ago and that he was surprised at the magnificent growth of the College. After chapel the delegation visited some of the classrooms and shops and left on the noon trains, satisfied that the College is doing its duty and doing it well.

The Agricultural College has received another present. Frank Rockefeller, a brother of Rockefeller of the Standard Oil Company, and the owner of a cattle ranch in Kiowa county, has sent the following letter to F. D. Coburn, of the Board of Regents of the Kansas Agricultural College: "After patient waiting I am now prepared to present you as an act of friendship, for the Agricultural College of the State of Kansas, the Hereford bull calf we talked of. He is a son of Columbus 17th that many good judges among my friends tell me should have unquestionably taken the championship honors at the late Chicago International show, instead of second place. I now have fifteen of his sons on hand, and this is the first of his get that I have ever disposed of. He is a calf I am willing to show against any Hereford calf in America. I told you I would not give you a calf until I could pick one that in my judgment would grow into an animal which, with proper care, could hold his own against all comers. I have made the selection and am now ready to make the delivery. Please advise me in relation thereto. He will do the College good, and will be well fitted both in blood and individuality to go into any herd."

The following lines are excerpted from an article in the *Kansas Farmer* on "Needed Legislative Appropriations." The article emphasizes one need in particular, but the friends of the College should understand that the institution has many needs. It is growing to day as never before, and the only place where its friends can ask for the necessary means is the State legislature. The *Farmer* says: "The reason for the maintenance of educational institutions is that it pays in promoting the effectiveness of the future citizens. Kansas' educational institutions have not asked more than the State can afford to invest in that kind of means for advancement of her material interests, to say nothing of the promotion of the development that can not be measured in money. Kansas has now two institutions in which every dollar wisely invested is likely to return many dollars in the material advancement of the State. Since 1887 the United States has paid $15,000 a year for the maintenance of an agricultural experiment station at Manhattan. A good deal of valuable work has been done in determining problems too expensive for the farmer to experiment with. The $15,000 a year from the United States continues and will support about the same amount of experimental work as heretofore. Quite recently the State has acquired a magnificent tract for an experiment station, namely, the old Fort Hays reservation. It is admirably adapted for the work that needs to be done with especial reference to conditions in the western half of the State. Within the last few years agricultural science has discovered that farm plants—corn, wheat, oats, the forage crops, including all grasses—indeed, everything that grows, is as capable of improvement by breeding as are cattle, horses, swine, sheep, and other animals. In this improvement the plant-breeder is able to so modify his plants as to adapt them, in some measure, to the peculiarities of the soil and climate of the region in which he

wishes to produce them. It has been further found that substantial increases in yield have been brought about by breeding. These increases have been most notable in the cases of wheat and corn. The Minnesota experiment station notes the production of strains of spring wheat which produce, on the average, some three bushels per acre more than the best the state had before. In Illinois, corn is noted with improved yields amounting in some cases to an excess of twenty bushels per acre. Minnesota spring wheat improvement does not help the yield of Kansas winter wheat. Illinois corn improvement in yield is not certain to be maintained on bringing the seed to Kansas, and is almost certain to be lost in western Kansas. What has been done in Minnesota and in Illinois can be done in Kansas. An increase of three bushels per acre in Kansas wheat would mean about 18,000,000 bushels, worth not less than $10,000,000 a year. An increase of even five bushels per acre in Kansas corn would mean another $10,000,000 a year in the wealth produced in the State. Increases in the value of other Kansas crops are quite as available as in wheat and corn. It will pay Kansas to invest judiciously and liberally in this kind of experimental development; to provide for the most vigorous prosecution of the work of plant-breeding; to retain the highest type of ability and energy in this work. The expense need not be very great and will be looked upon as entirely insignificant when results begin to appear."

ALUMNI AND FORMER STUDENTS.

Claud Masters, '99, has been appointed bookkeeper in the office of the State treasurer by Treas. T. T. Kelly.

J. T. Pringle, speaker of the Kansas House of Representatives, was a student in 1881. During most of the time since then he has been practicing law in Wabaunsee and Osage counties.

SCAB OR ITCH IN CATTLE.

(Press Bulletin No. 118, issued by Veterinary Department.)

Scab or itch, sometimes called mange, of cattle is caused by a minute mite *Psoroptes communis* var. *bovis* that lives upon the surface of the skin and burrows in the epidermis. It does not attack other animals than cattle, although scab of sheep is caused by a similar parasite.

Symptoms.—Scab or itch does not trouble cattle to a noticeable extent during the grazing season, when they are doing well on grass. Close observation is required to detect the disease in a bunch of cattle, but as soon as they are placed on dry feed, and cold weather sets in, the disease appears and, if the cattle are not doing well, in an aggravated form. Scab usually attacks young cattle, calves, yearlings, and two-year-olds, but may attack cattle of any age if they are "out of condition." The first symptom noticed is an intense itching of the skin, usually in the region of the neck or shoulders. The animals lick themselves, dig at the skin with their teeth or horns, rub against posts or barbed wire, often tearing the skin until it bleeds. The disease gradually spreads along the back, sides, and outside of legs, but does not attack the inside of the legs, thighs, or thin skin of the abdomen. In the early stages the coat looks rough; there is a scurfy condition of the skin; the scurf becomes mixed with a gummy exudate and forms crusts in the hair, sometimes one-half inch thick; the hair then comes off or is rubbed off the badly affected area, leaving bald patches of thick, calloused, wrinkled skin. These patches often show first and prominently on the top of the neck, as if the neck had been calloused from wearing a yoke. After the hair comes off the parasites leave that part and the hair grows in again. Animals suffering from scab present a dejected and debilitated appearance and fall away rapidly in flesh; they do not eat well and spend a great deal of time and energy in scratching themselves.

Scab spreads quite rapidly through a bunch of cattle, especially if the cattle are not doing well. Six or eight weeks after the disease first makes its appearance is sufficient time to disseminate the disease pretty thoroughly. Thrifty, vigorous animals resist infection longer than others, and recover more quickly under treatment than debilitated animals. The disease is spread by direct contact and by contact with infected posts, feed-racks, walls, etc., against which infected animals have rubbed. The mites will live from a week to ten days in protected places but are killed quickly by direct sunlight.

By scraping off some of the scabs, and especially the epidermis, from the infected part and placing the material in a clean, dry glass bottle, in a few hours minute white specks, barely visible to the naked eye, can be observed crawling on the inner surface of the bottle. By the aid of a hand lens these mites can be easily recognized.

Treatment.—As soon as the disease is discovered in a bunch of cattle the affected animals should be isolated, and the infected quarters and rubbing posts disinfected with a five per cent solution of carbolic acid. Affected animals should be well fed and cared for and be salted with a mixture of one pound of flowers of sulphur mixed with ten pounds of common salt. To cure the disease, external treatment must be applied. If a large number of cattle are affected, the most satisfactory method is to build a dipping vat, through which the animals must swim in the dip used to destroy the mites. The vat should be forty feet long. Efficient remedies used for external application are some of the coal tar products, such as Car-sul, Chloro-naphtholeum, Zenoleum, Creolin, etc.; these are used in two and one-half per cent solutions with water; that is, one part of the medicine to forty parts of water. A very effective and cheap dip is composed of lime and sulphur in the following proportions:

Flowers of sulphur.....	21 pounds.
Unslacked lime.....	16¾ "
Water.....	100 gallons.

Slake the lime to form a thick paste, sift in the flowers of sulphur and stir well; put this mixture in a kettle with twenty-five or thirty gallons of water and boil for thirty minutes at least; two hours is better. The chocolate-looking mass is allowed to settle, the clear liquid is drawn off and water enough is added to make one hundred gallons. All dips are more effective when used warm, from 100° to 110° F. Animals should be kept in the dip about two minutes, or until the scabs are thoroughly saturated. A second dipping in two weeks will kill any mites that may have hatched from the egg after the first dipping. One dipping, if thoroughly done, is usually sufficient, however, to free a bunch of cattle from this disease.

Where only a few animals are affected, hand treatment can be resorted to, but it should be thoroughly done. The remedies can be applied with scrubbing brushes, cloths or sponges, and all scabs and crusts should be thoroughly saturated. The remedy should be applied warm, as in dipping. In dipping or hand treating, warm, sunny days should be selected for treating the animals.

Cattle scab is rather common in some parts of the Great Plains region and stockmen in purchasing cattle should be cautious about getting animals affected with this disease. While the death loss is usually not high the loss of flesh, general deterioration and annoyance resulting from this disease is considerable. Cattle that have been treated should be carefully watched for reappearance of the disease, especially when taken off of grass the next season.

N. S. MAYO.

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THE INDUSTRIALIST

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THE INDUSTRIALIST.

VOL. 29. MANHATTAN, KAN., JANUARY 27, 1903. NO. 15

THE BLACK WALNUT.

THE wholesale destruction of some of the fine walnut groves along the streams of the State seems to partially warrant the agitation of a systematic planting of groves of that tree, or at least the conservative cropping of natural plantations. But the question as to whether it will pay in dollars and cents to cut out the black-walnut timber and sell it and plant the field to corn or keep the plantation in walnut and get the most out of it by conservative cropping, can only be answered by years and the figures they represent.

In this paper we have tried to approximate the income of an acre of corn and an equal area of black walnut and compound the interest on each for the full number of years that the walnut would have to stand to produce export lumber. The land rent would be the same in either case.

It must be borne in mind that the average farmer needs the annual rent from the ground, and a crop that holds back this income for a number of years must bring in a much greater rate of interest than the sum total of all the compounded interests of the products of the corn for all the years that the longer growing crop is on the ground. It must also be realized that the labor of caring for a walnut grove in which the trees are grown for commercial purposes is equal to if not greater than that required for an equal area of corn for a period of time equal to that which a walnut crop will require to mature. It is also true that the expense required to clear a piece of land of trees and stumps and put it into shape for ordinary cultivation is fully equal to the expense of keeping the same area of walnut trees growing in an upright and thrifty manner and keeping them pruned in such a way as to give the best trunk for the larger logs. The greatest care in this matter will pay in the end, as it means the difference between domestic and export lumber, which is a difference of about thirty dollars per thousand feet.

If the area of timbered land were worked into walnut trees, there

would be no expense of clearing, and planting for future growths may be begun immediately. The best method to follow in this case would be to gather the seed in the fall, then stratify it and plant it out in the spring. Several nuts should be put in each place where it is desired that a tree should grow, and the surplus of seedlings removed as soon as the stronger tree is detected. In this way the strongest growing trees and the ones that will bring the quickest returns are selected. As the young crop shows crowding, the nurse crop of older trees should be gradually thinned from year to year until the young grove is left to shift for itself. The thinning should never be so rapid as to allow our strong winds so free an access to the young crop as to give the trees a squatty appearance. Export lumber requires a long, straight trunk, free from limbs and knots.

In planting in untimbered soil, the nuts may be treated as in the above case or they may be planted several nuts in the hill in the fall. The rows may be planted eight feet apart and four feet in the row. The trees must be carefully thinned and trained to one straight stock. The young trees may be thinned as soon as crowding is evident, at ten or eleven years. At this age the trees are old enough to be thinned to a rod apart, twelve hundred of the thirteen hundred sixty trees to be removed. The trees removed may be cut into posts, which sell at a rate of ten cents each. Walnut posts, according to "Railroads and Forestry," last from five to twenty-five years, owing to the chemical action of the different soils in which they are set. It will be seen from this that the walnut is a very valuable tree as post timber, as it is usually held to be by the farmers. It may be safely assumed that the crop by clearing, counting the wood as well as the posts, will amount to an equivalent of fifteen hundred posts from the twelve hundred trees removed.

From the table of growths given elsewhere, as well as from records from other sources, it is fair to say that the trees will require at least thirty-three years to become eighteen inches in diameter in the best of soil. As export lumber must square from fifteen to thirty inches, it is fair to take a period of years long enough to grow trees of this class. From the tables of growth it will be seen that the growing of walnut logs for market is not a more sure income than is the growing of ordinary farm crops. These growths show plainly that unless the land shows an apti-

tude for remarkable growths of this class of trees it will not pay in dollars and cents to undertake extensive planting under the conditions of prices and cost of production.

Many of the by-products of the walnut which would go to make plantations of this sort profitable have been dispensed with during the past century. The advent of coal-tar derivatives and the more easily extracted oils has made their use impracticable. Several of these by-products were formerly used. Michaux, in *North American Sylva*, volume one, tells of a certain food called cerneaux, made of the half-ripe kernels, salt, and green grapes, which was eaten by the poorer people of Paris. He also discusses the laborious method by which the oil was extracted from the nuts. The meal, after the extraction of the oil, was used for the fattening of fowls. This oil is described in *Garden and Forest*, volume eight, as follows: "The oil of the black walnut is a straw-colored liquid of agreeable taste, and after six months the refined oil was without any disagreeable taste or odor. It is known as a 'drying oil.' Nineteen per cent of oil was obtained by pressure, while ether extract test showed fifty-five per cent." The oil was formerly used in the finer arts, being much used by painters. It was also used in copper-plate printing. After a special preparation of the oil, the backs of prints were treated with it, which prevented their turning yellow. But other oils, which may be more cheaply secured, have been introduced during later years and have largely crowded out the use of the oil of the black walnut. Peanuts and the English walnut have largely eliminated the use of the walnut as a food.

Michaux also says: "A fine stomachic liquor is made from the fruit of the walnut, gathered a month before its maturity. Twelve green nuts in the husk are bruised and thrown into a pint of good brandy; after they have steeped three weeks the brandy is filtered through brown paper and a fourth of a pound of loaf-sugar is added. This cordial is improved by age." Medicine has advanced since the day of the great botanist and we no longer use the tannin of the walnut shuck to toughen our gastronomic region.

The use of the shucks and bark of the black walnut for the staining of woods has also been almost eliminated from cabinet making since the advent of so many coal-tar derivatives which furnish most of the walnut stain that we use. Walnut stain as a dye for fabrics has now entirely passed out of use, though it was

much used up to the close of the Civil War. At one time the bark on all export logs was carefully protected so that none of it might be wasted during the transit, and even the bark on the twigs was used and protected in the same way, though the husks were the most valuable for dyeing purposes.

Whether any other preparations, as papier-mache, will crowd out the use of the wood in the next thirty years, as other products have crowded out the use of the oils and dyes of the walnut in the last thirty, is but a question of time and the necessity that may assert itself in that time. It will be safe to say that if the wood becomes scarce enough to warrant such an invention some article will be found to take its place and become so cheap as to crowd out the general use of walnut lumber.

The walnut is not a rapid growing tree, as is shown from measurements of trees taken along the Kansas river bottom, in a very rich sandy soil in which the roots could easily reach water and where the trees were well protected from the winds on the south by Prospect Hill and on the west by the trees growing along the river. The following are the measurements taken:

Years of age.	Diameter in inches.
50	18
45	21
39	16
55	25½
55	22
50	20
72	22

These trees were cut during the winter of 1901–'02, and in most cases were worked up into posts. A considerable number of smaller trees of the same age showed a much less average annual growth, while some of the younger trees showed a greater growth. The trees taken seemed to represent the average growth. These trees grew under the best of uncultivated conditions; in fact, the conditions were better than they would be under average cultivation, as the soil was very loose and was well protected from the sun and the water table was not over twelve feet below the surface of the ground.

Measurements of walnuts growing under very good cultivation alongside a cornfield and in a ravine, in a very black and rich loam, where one might find the best of soil as well as the best of care, shows the following growths:

Years of age.	Diameter in inches.
26	13
33	11

In the plantation of the Kansas Experiment Station made at the "old farm" by Professor Gale, in 1872, on a very gravelly clay soil, perhaps as poor a soil as any cultivated land around Manhattan, the trees show only an average height of twenty-six feet and a diameter of five inches. The highest tree was but thirty feet, with a diameter of eight inches. This plantation was as well cared for as any similar plantation could have been and gives almost conclusive evidence that on such land walnuts will not make returns sufficient to pay for the cost of breaking and cultivation.

In "Forestry of Mississippi Valley" by the United States department of agriculture, are given the following tables of growth as an average of the growth of the black walnut for the Mississippi valley. The circumference is taken at two feet from the ground:

Natural growth, 22 years, 48 inches in circumference.
Transplanted, 22 years, 50¼ inches in circumference.

That good, straight walnut logs are too much of a luxury for fence posts is shown by the following prices quoted for Kansas City by the Des Moines Lumber Company, Sheffield, Mo.:

	Diameter in inches.	Length in feet	Price per 1000 feet.
Straight Logs:	18–21	10–16	$43
	22–25	10–16	48
	26–29	10–16	53
	30–33	10–16	60
	34 and up.	10–16	70
Common Logs:	12 and up.	8–16	27

All logs must cut even lengths, and crooked logs that will make good lumber go in the next lower grade.

Taking the above prices as standard, we should compute the income from an acre of walnut timber as follows: We have assumed that we may in the beginning plant the trees four feet by eight feet, and at the end of eleven years cut them out to a rod apart. From this we have assumed that we might expect $150. It is fair also to assume that a fair per cent of interest would be six per cent for so long a time as twenty-two years. As principal will double itself in about eleven years, our $150 would amount to $600 when compounded for the length of time until the tree was thirty-three years old.

We will now assume that only one hundred of our one hundred sixty trees left on our acre will mature to saleable trees at the age of thirty-three years, and referring to the log table we find that the log eighteen inches through and fourteen feet long will saw

(Concluded on page 238.)

WINTER TERM (1903) PROGRAM, SHOWING IN

INSTRUCTOR.	First Hour.	Second Hour.	Third Hour.	Fourth Hour.
Walters	Proj. Drawing ... 18	Proj. Drawing....27	Geom. Drawing .30	Architecture....32
Evans		Geom. Drawing...28	Geom. Drawing...21	Obj. Drawing....36
Brown	Singing, Notation, Orchestra, etc			
Brown, R. H	String and Band Instruments			
Harris	Piano			
Willard[1]		Chemistry II.....50	Chemistry II.....34	Chem. of Foods..32
Weida	Chemistry II.....57	Chemistry II.....47	Chemistry I 62	Chemistry I.....42
Mathewson	Chemistry II.....62			
Shaw[1]	Chemical Analysis			
Popenoe[1]	Entomology..... 4	Zoölogy 26		
Dean[1]	Entomology 37			Entomology.....36
Scheffer				
Remick	Calculus. 32	Algebra II 27	Algebra III 45	Algebra III.....36
Anderson	Geometry I..... .41	Algebra III.....24	Trigonometry.....42	Trigonometry.....32
Bowen	Algebra II.....25	Geometry II 40	Geometry I.....37	Geometry II.....43
Eyer	El. Physics.....68	Physics. 17	Physics II.....19	Elec. Mach.....4
Hamilton	Physics II..... 7	El. Physics.....63	Adv. Physics..... 3	Physics II.....42
Goodell	Civics 56	Gen. History.....64	Gen. History.....55	Civics 41
Roberts[1]	El. Botany. 14	Morphology.....30		
Paull[1]			Morphology.....27	
McKeever	German 9	Phil. of Ed 6	Logic 29	Composition 30
Clure	Oratory III.....27	Oratory I.....21	Oratory II.....44	Oratory I.....22
McCormick				Eng. Power Plts..7
Paul	Kinematics 29	Kinematics 29	Mechanics 10	
House	Carpentry..... 26	Carpentry.....15	Carpentry.....44	Carpentry.....28
Wabnitz	Machine Shop, Mondays			21
Gasser	Blacksmithing 19		Blacksmithing 15
Ridenour	Foundry. 17		Foundry.....18
Otis[1]	Feeds & Feeding, 36		Feeds & Feeding, 38	Feeds & Feeding, 37
McIntyre		House Furn.....14		
Agnew	Elementary Cooking.....19		Elementary Cooking..... 22
Staatz	Elementary Cooking Laboratory.....		Elementary Cooking Laboratory.....
Mayo[1]	Vet. Science.....19	Dis. Farm Ani.....37	Dis. Farm Ani.....41	Dis. Farm Ani.....38
Barnes[1]	Bacteriology..... 2	Bacteriology.....35		Physiology.....58
Dickens[1]	Horticulture.....34			Horticulture.....15
Greene[1]	Forestry 4		Pomology.....14	Horticulture.....37
Baxter		Floriculture.....14		
Brink	Eng Literature...28	Eng. Literature...12	Am. Literature...43	Rhetoric ... .14
Rupp	Eng. Readings II..48	Themes 36	Eng. Readings II..39	Themes 30
Rice	Eng. Readings I.. 45	Eng. Readings I ..44	Composition 29	Eng. Readings II..38
Rowan	Drill, 7:50 A. M.			
Webster[1]	Dairying.....47	Feeds & Feeding, 38	Dairying..... 35	
Grant	Bookkeeping.....36	Bookkeeping.....35	Bookkeeping.....35	
TenEyck[1]				Agriculture.....38
Shoesmith[1]				Br. & Breeding....38
Rickman	Printing... 6	Printing..... 3	Printing. 4	Printing..... 1
Jones	Dressmaking..... 16	Dressmaking.....18		Sewing III & IV..24
Cowles	Dressmaking.....12	Dressmaking.....14	Sewing III.....13	
Coe	Sewing II		Sewing I	
Stump	Sewing I. 9	Sewing I.....12	Sewing II	
McFarland	Algebra I.....41	Bookkeeping.....46	Bookkeeping.....36	Bookkeeping.....42
Holroyd	Composition 30	Algebra I..... 38	Algebra II 28	Algebra II 29
Short	Algebra II 31	Algebra II 24	Algebra I.....29	Algebra I.....31
Clure				Calisthenics. 17
VanDivert		Eng. Reading I....28	Eng. Readings I...35	Eng. Readings I..40
Mather			Eng. Readings I...38	
Mudge	Algebra I.....29		Algebra II 21	
Derr				
Ross				
Thompson				
Vail				
Noyes				
Finlayson				
Lund	Apprentices			
Logan				10
Weeks		F. H. Drawing 14		F. H. Drawing ... 30

[1] Experiment Station Work.

Morning Class Hours (Tu. W. Th. F. S.).

1. From 9:05 to 9:50.
2. From 9:55 to 10:40.
3. From 10:45 to 11:30.
4. From 11:35 to 12:20.

STRUCTOR, SUBJECTS, AND NUMBER IN CLASS.

Fifth Hour.	Sixth Hour.	Seventh Hour.	Eighth Hour.
Geometrical Drawing	Tu., 36; W., 31; Th. 39		
Geometrical Drawing	W., 28; F., 16		
Object Drawing	Th., 24		
Chemical Laboratory	104		
Chemical Laboratory	36		
Zoölogy Laboratory	26		
Physics Laboratory	28		
Botany Laboratory	50		
Botany Laboratory			
Engineering Laboratory	7		
Graphic Statics	T., 27		
Mechanical Drawing			33
Carpentry	W. & F., 8	Carpentry	W. & F., 14
Machine Shop			Tu. & Th., 24
Machine Shop	W. & F., 27	Machine Shop	W. & F., 27
Blacksmithing	22	Blacksmithing	21
Foundry	Tu. & Th., 17; W. & F., 8	Foundry	Tu. & Th., 19; W. & F., 20
Graduates		Tu. & Th., 3	
Domestic Science II		W. & F., 38	
Domestic Science II Laboratory		W. & F.,	
Bacteriology Laboratory		4	
Horticulture Industrials	35		
Floriculture, 7:50 A. M	20		
Dairying Industrials			35
Cheesemaking			
Agriculture 93	Agriculture 73		
Br. & Breeding 53	Br. & Breeding 54		
Printing	Tu. & Th., 10; W. & F., 9		
Dressmaking	17		
Dressmaking	13		
Calisthenics 28	Calisthenics 26	Calisthenics 31	
	U. S. History B 45		
	Grammar A 32	Grammar A 36	
Arithmetic A 49			Arithmetic A 37
Arithmetic B 29	Arithmetic B 31		
	U. S. History A 34	U. S. History A 23	
Grammar B 30		Grammar B 36	
		U. S. History B 31	Geography 17
			Reading & Spelling 27
Boiler and Engine Laboratory		Tu., 6; W., 6; Th., 6; F., 6; S., 5	
El. Physiology 32			
Freehand Drawing	Th., 27; F., 22		

Afternoon Class Hours (Tu. W. Th. F. S.).
5. 1:35 to 2:20.
6. 2:25 to 3:10.
7. 3:15 to 4:00.
8. 4:05 to 4:50.

Afternoon Industrial Hours (Tu. W. Th. F.).
5. From 1:30 to 2:30.
6. From 2:35 to 3:35.
7. From 3:50 to 4:50.
8. From 4:55 to 5:55.

one hundred seventy-one feet of lumber. The hundred trees would cut seventeen thousand one hundred feet, and referring to the prices as quoted for Kansas City we see it is worth $43 per thousand feet. This would make an income of $838. Adding the income twenty-two years previous and compounding up to the present time the total amount would be $1438. The income from an equal area of corn, interest compounded each year, would amount to $1250 at the end of thirty-three years. This would leave but a margin of $190 for the acre of black walnut.

The above figures warrant the conclusion that the growth of walnut logs for commercial purposes in the future would be more of a hazard than most any farmer would care to take. The risk and the very small margin would hardly be sufficient to cause any man to waste good land that might be planted to farm crops which would pay better. There are many crops of wood that would pay much better and would bring in their returns much sooner than would the walnut. It is also true that there is no reason for the present waste of good walnut logs, by cutting them up into fuel and posts which might as well be sold at from $25 to $100 per thousand feet on track here at Manhattan. There are many good walnut trees in Kansas that might as well be cut and made into lumber and room made for the young growths of trees that are striving for a foothold beneath.

S. C. Mason, in "Variety and Distribution of Kansas Trees," tells of a tree from Leavenworth county, exhibited at the World's Fair, which measured over seven feet in diameter and was fifteen feet long. This is said to be the finest log ever cut in America. Such a log would easily make the finest of export lumber and would command the highest price paid for this kind of timber.

All over Kansas these fine trees which would make the finest of furniture and gunstocks are cut each year and worked into fuel and posts. Though there are records of plantings in Virginia, and a few in the west, where money has been made from the venture, it is safe to say that no man in Kansas can afford to make very extensive plantings of this timber; yet it would be one of the surest insurance policies that a man could buy and one of the safest banks in existence. It may even be true that, if walnut is crowded out of commerce to a great extent by some imitation, it will become more fashionable as decorative and furniture lumber, thus increasing the value of such a plantation. G. O. GREENE.

THE INDUSTRIALIST.

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Manhattan, Kansas.

PRES. E. R. NICHOLS.....Editor-in-Chief
PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

Bulletin No. 115, on "New Method of Calculating Balanced Rations," will be mailed in a few days.

The intersociety oratorical contest of the College will be held in the chapel on the evening of January 31.

The Ionians and the Hamiltons, who occupy the north society hall in the basement of the library building, will soon have a new carpet.

Professor Goodell delivered a lecture before the January meeting of the Manhattan Domestic Science Club, on "The French Revolution of 1848."

The following members of the Faculty have been reëlected by the Kansas State Board of Agriculture: H. F. Roberts, botanist; J. T. Willard, chemist; E. A. Popenoe, entomologist; N. S. Mayo, veterinarian.

Prof. D. H. Otis has requested poultry breeders and farmers to furnish two specimens each of dressed poultry for the poultry judging week, February 16 to 21. The poultry will be either returned or paid for.

Ex-regent C. B. Daughters, of Lincoln, who moved to Manhattan last summer to educate his son, has formed a partnership with Attorney A. M. Story, and the firm will hereafter be known as Daughters & Story.

Prof. D. E. Lantz went to Topeka Monday morning to appear before a committee of the house of representatives. As he was running to catch a train he was tripped by a wire and thrown to the ground, severely bruising his right hand and scratching his face.

C. P. Dewey has begun the erection of an enlarged sales arena at the sales yards and will have it ready for use at the McIntosh thoroughbred sale in February. The arena when completed will accommodate about a hundred head of cattle, and is just what Manhattan has needed for a long time.

When speaking of the election by the Board of Regents of assistant C. E. Paul two weeks ago we stated that he was a graduate of Worcester Polytechnic school. We have learned since then that Mr. Paul is a graduate of the well and favorably known Massachusetts Institute of Technology.

The sophomore and freshman girls played a match game of basket-ball in the Gymnasium last Saturday afternoon. The game was won by the sophomores.

To-night, Tuesday, Mr. Chas. H. Harrison, special agent and expert of the office of public road inquiry of the United States department of agriculture, Washington, D. C., will give an illustrated lecture on "Good Roads," in the College chapel, to which all students and members are cordially invited. The subject of roads and road building is an important one; it deserves to become a hobby with the farmer of the present.

Former students of the State Agricultural College were present and made their influence felt at the improved stock-breeders' meeting. Among them we noticed Chas. E. Sutton, Russell, who was elected president of the association, Prof. D. H. Otis, of the chair of Animal Husbandry, Ed. Webster, of the chair of Dairy Husbandry, and J. G. Haney, of the Fort Hays Experiment Station of the Agricultural College, H. W. Avery, the big Percheron breeder of Wakefield, Fred. Zimmerman, who won a name as an expert dairyman and then went to Missouri, Professor Curtis, who lectures in the Agricultural College short course, L. H. Neiswender, one of the best farmers in the Silver Lake bottoms, Theo. F. Morse and wife, *nee* Helder, of the *Indicator*, and "Johnson of Clay," who hustles for the *Western Breeders' Journal.*—*Kansas Farmer.*

Last Friday morning the College was visited by a second delegation of senators and representatives. There were about forty members in the visiting party, and several of them were accompanied by ladies. They were piloted by Rep. Frank Emmons, of Riley county, and Pres. E. R. Nichols, of the College. The morning was stormy and the ground was covered by snow, making the usual outdoor military drill impossible; but the party attended the morning chapel exercises and were warmly received there by the students, who had somehow found out that the law makers were to be present, and to say that the chapel was crowded to the last inch is putting it mildly. Cheer upon cheer went up from the energetic lungs of the young Kansans. At the close of the exercises President Nichols asked a number of the legislators to address the students, and several of them responded. The addresses were well received by the students, especially the assurances of the visitors that they would give the Agricultural College its needed means for the next two years. After chapel the visitors inspected the dairy barn and the cattle sheds, the new Physical Science Hall, the Agricultural Hall, the mechanical workshops, the library building, and domestic science hall. All were greatly impressed by the crowded condition of most of the classrooms and the energetic and business-like manners of the students. We talked to several of the gentlemen about the needs of the institution, and all assured us that they were in favor of doing the right thing for this, the most characteristic educational institution of Kansas.

We read in the city papers that the city fathers have passed an ordinance to build a brick sidewalk along the west side of Juliette avenue from Poyntz Avenue to the athletic park. This is good news for the students. Now, let a walk be built from the College down along Vattier street to the athletic park and the measure of our feelings of gratitude will be full.

The INDUSTRIALIST stated two weeks ago that the number of students enrolled in the Department of Industrial Art was above four hundred. This was true enough, for since then the number has passed the five hundred and six hundred mark and there are twenty-one classes in working order. As a result, Miss Ella Weeks has been employed to teach six classes in freehand drawing and Professor Walters had to give up his lecture-room in graphics for a class room in freehand. Other departments are in the same condition—more students, more classes; more teachers, more room!

LEGISLATORS VISIT THE COLLEGE.

Reporter J. P. Fritts, of the Topeka *Daily Herald*, who accompanied the legislative delegation that visited the College last week, gives the following interesting account of the event:

"The average individual who has never seen the College can form but a faint idea of the scope and magnitude of the work done there. Without for a moment disparaging the good that is and may be done by other State schools, this is preëminently the college for the great plain people. Its students in large measure are from the farms in remote districts where advantages are few and brain waits on brawn. It is admitted by those who visit the institution with a view to ascertaining the work done there, that its many sided courses of study fit young men and young women for the hard knocks of life as perhaps no other courses would. An 'industrial' is made obligatory. No student can escape it. While his brain is trained to work, he must at the same time work with his hands or go back home. This accounts in a large measure for the magnificent grounds surrounding the College buildings. These are laid out under intelligent direction, with a view to the artistic, and the visitor is always impressed.

"When the legislative party was taken in charge by the committee from the Manhattan Commercial Club yesterday morning and driven to the College in tandem, tallyhos and coaches they were prepared to find the needs of the institution accentuated. That, of course, was what they were brought there for; because the promoters of the trip wanted them to see the actual needs of the in stitution. The scene was an inspiring one, to put it mildly, when the party entered the little chapel. This little room, with a seating capacity of 650, cuts but a sorry figure when it comes to accommodating 1400 students. Every seat was filled; the gallery was filled, even to a fringe of uniformed legs belonging to the College cadets, which hung over the outer rail at the imminent risk of the owners' lives; and the halls and stairways were filled with a buzzing mass of students who were waiting for chapel exercises before going to the class rooms. As the party marched down the

aisle and onto the stage the College band and orchestra played an inspiring tune while the student body rent the ozone with the College yell.

"President Nichols, after a few brief remarks, introduced Representative Bevington, of Jewell county, who was a student in the early days. Mr. Bevington's reference to 'K. S. A. C.' instead of the longer form 'Kansas State Agricultural College' brought forth a good deal of applause from the students. Mr. Bevington was followed by Senator Fitzpatrick, of Chautauqua, and Senator Branine, of Harvey. All the speakers paid fine tributes to the College and indicated that they, as well as the other members of the party, would not be unmindful of its needs when the time came for passing the appropriation bills. When they had concluded there were loud calls for Mr. Emmons, the hustling member from Riley county. Emmons is a bachelor who has never faced all of life's stern realities, therefore he blushed and kept his seat. The calls became so insistent, however, that he came forward and expressed his frank and hearty acknowledgment of the honor paid him. Emmons has a host of friends both in and out of Riley county. He is found working in season and out of season for the Agricultural College, is a good mixer, and will probably get what he wants from the legislature.

"After the chapel exercises the visitors were shown through the various departments of the College. They stepped into class rooms, hurriedly judged the fine stock, made an inspection of the machine shop, Dairy and Domestic Science Departments—in fact they visited every department of the College and were deeply impressed with the thoroughness of the work done on all sides. The committee from the Manhattan Commercial Club left nothing undone for the comfort of the visitors."

ALUMNI AND FORMER STUDENTS.

J. A. Plowman, second year in 1897, is now a successful contractor in Jewell City. He is building a six thousand dollar residence for a prominent citizen of Smith Center, and has other good jobs ahead. Among the other good things that he gained at the College was his wife, Etta Ridenour-Plowman, '96.

ALUMNI IN WASHINGTON.

The following items have been received with much pleasure from Gertrude Havens-Norton, '96, secretary of the Washington Alumni Association:

The annual meeting of the Washington Alumni Association of the Kansas State Agricultural College was held at the home of M. A. Carleton, in Washington, Friday evening, January 9, 1903. The alumni were well represented, there being present fourteen out of the twenty-three members. The officers elected were: M. A. Carleton, '87, president; C. L. Marlatt, '84, first vice-president; Julia Pearce, '90, second vice-president; C. F. Doane, '96, treasurer; Gertrude Havens-Norton, '96, secretary. An animated discussion of College affairs showed that the alumni here

are much interested in their Alma Mater and anxious to see her make still more rapid progress in the future than she has in the past. Those present were L. W. Call, '83; Margaret Carleton-Doane, '96; C. F. Doane, '96; Gertrude Lyman-Hall, '97; W. L. Hall, '98; M. A. Carleton, '87; Bertha Winchip-Spilman, '91; L. A. Fitz, '02; C. L. Marlatt, '84; J. B. Norton, '97; G. H. Failyer, '77; G. F. Thompson, J. B. S. Norton, '96, and Gertrude Havens-Norton, '96.

Among the alumni visiting Washington and attending the American Association for the Advancement of Science recently held in this city were H. N. Whitford, '90, Chicago, Ill.; E. F. Nichols, '88, Hanover, N. H.; Philip Fox, '97, Hanover, N. H.; Abbie L. Marlatt, '88, Providence, R. I., and S. W. Williston, '72, Chicago, Ill. Those of the alumni presenting papers were E. F. Nichols, W. L. Hall, S. W. Williston, C. L. Marlatt, W. T. Swingle, J. B. Norton, J. B. S. Norton. A. S. Hitchcock and W. A. Kellerman formerly professors of botany at the College were also present and presented papers. Those holding office in the association, or some of its affiliated societies, are: S. W. Williston, Chicago, president Sigma Xi Honorary Scientific Society, E. F. Nichols, vice-president of Section B, and J. B. S. Norton, secretary of the Botanical Club of the Association.

The T. P. M. Club, of Washington, met at the home of the president, Mrs. Margaret Carleton-Doane, '96, in Hyattsville, January 13. Interesting and able papers were presented by Mrs. A. S. Hitchcock and Mrs. Doane. A paper to have been presented by Mrs. H. A. Lyon, a former student, was postponed for lack of time. The subject for the day was "Prisons and Prison Life." K. S. A. C. women do not lose their interest in study when they leave the College walls.

Mr. and Mrs. M. A. Carleton, who have spent some time in Kansas and Oklahoma, are again at their home in the city.

E. C. Butterfield, '98, who has been quite ill, is again able to be at his work in the bureau of forestry.

Geo. F. Thompson, M. S. '02, is making a flying business trip to Kansas.

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For catalogue or other information, address

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THE INDUSTRIALIST.

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A TEST OF METHOD.

IT has been arranged to prepare a series of articles setting forth the result of a number of practical psychological experiments among the students of the Kansas State Agricultural College. These experiments are being made with a view to becoming better acquainted with the mental status of students. This is the second paper, the first having been entitled "A Test of Attention."

It is now proposed to show the results of an investigation of the methods of study of over one hundred students. The test was planned carefully by myself, and the members of the psychology class, who secured the data, were given detailed instructions as to methods of procedure. Especial effort was made to remove every incentive for deception on the part of those questioned. I believe that a fair measure of truth was secured in every case.

In making this test fifty-eight young men and fifty-three young women, one hundred eleven in all, were selected at random and asked the questions given below. Among the number were thirty-two seniors, twenty-nine juniors, twenty-six sophomores, and twenty-three freshmen. The questions follow:

1. Do you follow any definite program of study and work during the average College day?

To this question twenty-three young men and twenty young women gave affirmative answers; twenty-five of the former and twenty-six of the latter gave negative answers; and ten of the former and seven of the latter gave doubtful answers. The doubtful ones could only show that they were pursuing an indefinite sort of method, and that intermittently.

2. If you have a definite method, how is the time allotted to your several studies? Do you have a regular and a fixed hour for each?

Of the forty-three answering the first question affirmatively, all

prepared their lessons in a regular order, and seventeen divided the time, attempting to take up a certain study at the same hour each day. Ten studied the most difficult lesson first, seven the easiest or most enjoyable first, and eight followed the order of the recitations. One young woman devoted her time chiefly to the lesson on which she would probably have to recite the next day and slighted the others.

3. What advantage is there in your method?

On this question those having a method were almost uniformly of the opinion that there resulted much better and more efficient work and a great saving of time. Only one answered "Not much." One of the members of the class making the investigation said in his summary: "I noticed that the students who have a regular routine do much better work than those who do not." Others gave practically the same report.

4. How do you deal with visitors who call during study hours?

The answers to this question were sometimes amusing. Fifteen young men and seven young women testified in substance that they gave such visitors a "cold reception," while twenty-three of the former and thirty-seven of the latter "laid aside work and treated them cordially." Various other answers were given. Seven young men were "not bothered by callers." One young woman said, "I turn them out and say good night;" another, "I bring them in and treat them right."

I believe the question of dealing with callers to be rather a serious one for the average student. There are always located in the vicinity, loafers, who may be expected to call during the busiest hours. Such intruders are amateur highwaymen and should be summarily dealt with. There are a dozen tactful ways of forcing them out. Right here comes a test of character. To yield at this point, to a temptation to "lay aside work and be cordial," is indicative of weakness.

5. Have you given this question of method of study any particular attention?

The answers here were somewhat surprising. Only seventeen of the one hundred eleven (eight men and nine women) answered "yes," while seventy-three answered "no." The remaining twenty-one were either doubtful or undecided. There was much evidence in the answers that very few had put forth any conscious

effort to solve this problem. Many of those who had an orderly plan of study were found to have developed it more or less unconsciously. Below is a summary:

	Male	Female	Total
Question One.—Definite Program.			
1. Yes	23	20	43
2. No	25	26	51
3. Doubtful	10	7	17
Question Two.—Order of Study.			
1. Regular order	23	20	43
2. Attempt to divide time *	9	8	17
3. Most difficu t lesson first	.....	.....	10
4. Easiest lesson first	.....	.....	7
5. Order of recitation followed	.....	.....	8
Question Three.—Advantage of method.			
1. Saving of time, better work, and the like	22	20	42
2. Not much	1		1
Question Four.—Dealing with visitors.			
1. Cold reception	15	7	22
2. Cordial reception, lay aside work	23	37	60
3. Not bothered	7		7
Question Five.—Previous serious thought on the subject.			
1. Yes	8	9	17
2. No	37	36	73
3. Doubtful	13	8	21

* Numbers two, three, four and five are, of course, modifications of number one, question two.

The students of this College, as a rule, are remarkably diligent and faithful in the performance of duty, but they lack greatly in method of study, and herein results a tremendous waste of time and energy. This investigation shows that the seniors average little or no better than the freshmen in point of method. Unless some unusual influence is brought to bear upon them, the habits of study formed during the first year are continued throughout the course.

It will be noted that over forty-five per cent of those questioned had no regular method of study, while an additional fifteen per cent followed almost no plan. Only fifteen per cent had given the matter any definite attention, the others pursuing a plan having stumbled upon it unconsciously.

Statistics will show that a majority of those who fail in life are industrious and enthusiastic enough, but that they are lacking in a definite plan or method of procedure.

To have forethought, to plan the work carefully before undertaking it, to be able to expend all one's energies day by day in the direction of effective effort, is to possess one of the highest qualifications for success. Here, I believe, is the point at which our students are weakest.

W. A. McKeever.

COLLEGE-BRED YOUNG MEN WANTED.

IN the Chicago *Record-Herald* William E. Curtis says: "I have received the following inquiry from a clergyman in the interior of Illinois: 'You say that Marshall, Field & Co. are anxious to obtain college-bred men. Are they anxious enough to pay them salaries that will justify them in accepting the positions offered? A young man who has paid as much as $5,000 for his education cannot afford to accept a meager salary. I know of several college-bred young men who will be glad to get positions if that firm can afford to pay them the wages they ought to have.'

"I know several young gentlemen whose education cost a great deal more than that, and yet they are entirely worthless, for all practical purposes. A college-bred man, like every other candidate for success in life, is worth exactly what he earns, and he usually receives it. Good men are scarce. They are in demand in every branch of industry and commerce, but the fact that a young man's parents paid $5,000 for his education does not qualify him to edit a newspaper, or command an army, or manage a railroad or a mercantile establishment, or argue a case in the supreme court, or act as a leader in politics. Those duties require skill, judgment and experience, which, however, may be acquired.

"Special training is required after graduation for any field of usefulness the young college man desires to enter. If he intends to follow a profession he will have to spend two or three years in a law, medical or divinity school, where he will be earning nothing; if he goes into a mercantile establishment or manufactory he must begin at the bottom and learn the business, and will be paid a very small salary until he earns more. Marshall, Field & Co., and other merchants, pay beginners $6 or $7 a week—Field and Selfridge both began at similar salaries.

"Horace Greeley once said that he did not want any college graduates or other horned cattle around his printing-office, and everybody who has to do with ambitious young college men will understand exactly what he meant; because, as a rule, college men never know half as much about how things ought to be done as they do immediately after graduation. That is the reason why so many of them fail.

"About twenty years ago two young graduates, classmates and roommates, found positions in a business establishment. The first work assigned them was putting garden seeds in little

bags and sewing them up with a long needle and coarse cotton string. One of them revolted. He said: 'This sort of work is not appropriate for an educated man. What would people say if they knew I was engaged in such menial labor? Any child eight years old could do it; and I was awarded the Greek oration upon my graduation.' He left the place disgusted, spent the rest of the summer trying to find something more suitable to his taste and talent, finally concluded to enter the pulpit, spent the next three years in a theological seminary, and is now pastor of a little country church in Ohio with a salary of $600 a year. His classmate put the rest of the seeds in the little bags, drew $5 a week for a while, was promoted as he learned the business, and is now managing partner of one of the largest seed establishments in the world, with a salary of $15,000 a year and a quarter interest in the business.

"Admiral Dewey's son graduated from Princeton in 1896, and while the whole world was shouting honors to his father, he was doing errands for a New York firm at $6 a week. He is now in charge of the branch office of that firm in Chicago.

"I know a college young man who sits behind the railing at the entrance of a lawyer's office in Chicago and is paid $5 a week for running errands, sharpening lead pencils, copying the correspondence of the firm with a letter press and taking in the cards of callers. The subject of his oration on commencement day was 'The influence of educated men upon civilization,' and it was pronounced a remarkable example of logic and oratory. His education cost more than $5,000. He will 'get there' himself some time, like his father, who is one of the foremost men of this country and began in a similar way."

And so it is with most college bred men. The fact that they may have a diploma will not help them through the world; but if they have an education and plenty of push and energy they may begin at the bottom and soon work their way up. It is not the fact that one has an education, but that he may apply it, which puts a man to the front.

Occasionally one will be told of a certain man who has gained notoriety and wealth who "cannot write his own name." The same person will tell you of "scores of college graduates who are working as day laborers." Both are true. But the former are scarce. Frequently one will meet persons with natural tact and

ability who did not have educational advantages. But suppose this same person had an education: how much more broadened would be his capacity for obtaining greatness and wealth? But the regrettable fact is, that so few people have this "natural" ability. On the other hand, if one has not a reasonable degree of energy his education will avail him little. If he has the education, backed by energy, persistency and push, and is willing to "line up" with the uneducated mind and untrained hand and apply himself, he is bound to succeed.

There *is* a demand for college-bred young men. Frequently the writer receives letters like the following: "Can you refer me to some good printer; an all-around young man who has education along other lines than printing?" "I find that the young man who has had the advantage of college training makes a much more valuable employe than the young man who has simply learned to 'set type.'" Some of the larger railroad companies have laid down the rule that they will give the preference to college-bred young men when filling vacancies. But they must begin at the bottom—a clerkship at $5 or $6 per week—and learn the business, working their way up by degrees. One can scarcely pick up a daily paper but that he will see a comment on a promotion to some responsible position, telling of how the one promoted began and how, by energy and faithfulness, he has gradually risen to his present position.

J. D. RICKMAN.

BASKET-BALL FOR WOMEN.

THE game of basket-ball was originally instituted for the young men of the Y. M. C. A. Training School, at Springfield, Mass. It was originated by Dr. James Nainsmith, early in the year 1892. In it at once, however, was recognized that which directors of gymnasiums for women had long been seeking; a game which would hold the same relation to physical training and development of women that baseball and football hold to the physical development of men. Colleges and training schools for women, everywhere, began to adopt it, and it was taught by their graduates until to-day the college or high school with a gymnasium for women which does not include it as an important part of the work is exceptional.

Soon, however, experience proved that the game as played by men contained elements too rough to be entirely suitable for

women. Directors began to modify the rules. Miss Clara Baer, of Newcomb College, The Boston Normal Training School, Doctor Sargent, and others, had their modified rules printed. Smith College played with modified rules as early as the fall of 1892.

The necessity for modifying the rules was apparent from the fact that the majority of women playing the game found it expedient to do so. Because of the dissatisfaction arising from no two institutions playing exactly the same game came the need of uniform rules for women.

In 1899, at a conference of physical training held at Springfield, Mass., a committee was appointed and rules were drafted by them which were accepted as the official rules. To-day, in the majority of gymnasiums for women, the game is played by the modified rules—line basket-ball, as it is sometimes called. The principal points of difference between the rules for women and those for men are the dividing of the field into three equal parts and a time limit substituted for taking the ball from an opponent. That the division of the field into three parts is best for the majority of women is not questioned. It is true there may be some cases where the men's game can be successfully played by women, but they are rare. As this division eliminates, to a great extent, "star" playing, equalizes the players and prevents undue physical exertion, it does much to promote team-work. At the same time the tax on the heart is less. An alarming number of cases of hypertrophy of the heart was the result of playing the original game, while the results of tests in schools using the modified rules, where the players were under medical supervision, have proved that this danger was entirely eliminated. Snatching or batting the ball from an opponent's hands contained the most objectionable feature of the game, that of rough play. By all rules of right, courtesy and fair play the ball is the property of the player holding it. In doing away with this element the new rules substituted a short time limit—three seconds—which entirely prevents the game becoming slow or monotonous.

The game is of the greatest value in the well-rounded physical education of young women. It combines the results obtained from classwork as well as from horse, bars, rings, jumping, marching and running in one interesting whole. With the exceptions of the last two exercises, gymnasium work calls for the continued activity of certain few muscles for short periods, while the

exercise which calls upon a large number of muscles for endurance for a longer time can only be secured in a competitive game. Basket ball tends to increase strength, endurance, and lung capacity, and, above all, those hygienic effects of muscular exercise which are the greatest reason for muscular exercise at all. The competitive element and swift action of the game make it vastly interesting, not only to the players, but to spectators as well, to whom it is easy of comprehension, the plays being open and clear even to one unacquainted with the rules.

Another of the good results obtained from basket-ball as a women's game is the demand upon the players to subordinate self-interests to those of the team. A team of fairly good players, playing a strong "team game," will win over a team of experts, each playing for herself. The experience of directors who have taught both men and women proves that it is far more difficult to get women to do good team-work than men. Dr. Luther Gulick accounts for this from the fact that boys, from childhood, are more loyal to the group to which they belong than even to their own parents. While one finds this grouping among girls, it is not to the same extent, nor are the societies so persistent nor so inclusive of all the interests of the individual. He says: "Man's life seems to take more naturally to organization than does woman's. Man's life appears to be more related to loyalty to groups, while woman's seems to be more related to loyalty to the home and its interests." A game which tends to develop this loyalty of woman to woman is surely no small factor in her education. The gain of self-control, both of temper and physical action, so essential to a good player in the excitement of the game, is not to be minimized.

Miss Senda Berenson, director of Smith College, in discussing basket-ball, says: "Now that woman's sphere is constantly widening; now that she is proving that her work in certain fields of labor is equal to man's work and hence should have equal reward; now that all fields of labor and professions are opening their doors to her, she needs more than ever the physical strength to meet these demands. And not only does she need a strong physique, but physical and moral courage as well. Basket-ball is the game of all others that has proved of the greatest value to her. It is played with deep earnestness and utter unconsciousness of self. Certain elements of false education for centuries have made

woman self-conscious. She is becoming less so; but one finds women posing even in tennis or golf. It is impossible to pose in basket-ball. The game is too quick, too vigorous, the action too continuous to allow any element to enter which is foreign to it. It develops quick perception and judgment, physical and moral courage, self-reliance and self-control, the ability to meet success or defeat with dignity." EDITH NICHOLS-CLURE.

BULLETIN REGARDING BALANCED RATIONS.

BULLETIN No. 115 has been received from the State printer. Its title is "The Exact Calculation of Balanced Rations." Part of the subject-matter of this bulletin appeared in the INDUSTRIALIST last March. In its present form it contains several very valuable tables unlike anything heretofore published anywhere. The author, Prof. J. T. Willard, summarizes it as follows:

"This bulletin, combating the statements of text-books and bulletins on computing rations, demonstrates that rations of any degree of complexity may be balanced with absolute exactness by simple arithmetical processes if feeds are available of the necessary composition. The greater the number of points in which it is desired that the ration shall meet a certain standard, the greater the number and variety of feeds that must be available. If efforts are limited to a mixing of feeds so as to produce a definite nutritive ratio, the necessary calculations for balancing two feeds can be made in ten minutes, using the data given in any table showing the percentage of digestible nutrients in the feeds.

"To materially abridge the labor of balancing a ration and to bring the arithmetical process within easier reach of all, the nutritive ratio for each of a large number of the more common feeds has been calculated and included in tables showing the composition of feeds and rations. Another factor has also been calculated for each feed, which is called the protein-equating factor. This factor shows the number of pounds of a feed that must be taken to get one pound of protein. By using the nutritive ratios and protein-equating factors provided in the tables, a ration of two feeds can be balanced to any intermediate nutritive ratio in one and one-half minutes or less.

"The bulletin maintains, and the method of calculation is based upon the fact, that, reduced to a final analysis, the balancing of a ration consists in balancing the feeds used in it two by two. In

this pairing, any one of the feeds may be used more than once, and the several quantities of a feed so used are finally added together to obtain the total sum. Recognition of the compound nature of this sum is essential to an understanding of the theory of the balancing of rations.

"After giving in detail the method of exactly balancing rations in respect to protein, fat, and carbohydrates, a simplified procedure is suggested as ample for practical requirements with ordinary feeds, in which the ration is balanced in respect to protein and non protein merely.

"Finally, a table of over 2100 balanced mixtures is given, showing the relative amounts of certain feeds to be used to at least approximate the nutritive ratios required by the feeding standards for the domestic animals. Figures are given for fourteen different ratios. The mixtures given may in many cases constitute a ration; in others, a ration may be compounded by using, in any proportion desired, any of the various mixtures having the same nutritive ratio."

K. S. A. C. POULTRY INSTITUTE, FEBRUARY 16 TO 21, 1903.

LAST year the Kansas State Agricultural College gave her first Poultry Institute and Judging School. The popular and well-known poultry judge, C. H. Rhodes, was secured for a week, and instructed the students and visitors in practical and fancy poultry. This institute, although the first attempt, was a decided success, and the week of February 16 to 21, 1903, was selected for the next poultry institute. Judge Rhodes has again been secured, and many prominent poultrymen have consented to appear on the program. The College birds, and many of the standard-bred birds, which the Manhattan breeders have consented to loan the school, will be in the judging-room. Every afternoon in the week Judge Rhodes will give instruction in the judging hall, and students and visitors will be given score-cards and birds to score for themselves. All kinds of poultry appliances will be on exhibition during the week.

The program for the week will be as follows:

Judging school, conducted by C. H. Rhodes, in the College judging hall, from 1:30 to 3:30 every afternoon.

Monday afternoon.....Volunteer class
Monday evening.....Special poultry program, in College chapel
K. S. A. C. Agricultural Association.
Tuesday afternoon.....American breeds
Wednesday afternoon.....American and Asiatic breeds
Thursday afternoon.....Mediterranean breeds
Friday afternoon.....Miscellaneous, Turkeys, and Ducks
Saturday afternoon.....Judging contest for students

Thursday afternoon, at 3:30, in the College chapel, the following program will be given:

Buff Leghorns.....Hon. A. Kinkead, Burnet, Tex.
Pekin Ducks.....E. E. Smith, Lincoln, Neb.
Silver Laced Wyandottes.....Mrs. E. A. Creel, Carrollton, Mo.
Pigeon Breeding.....C. E. Fairchild, Topeka, Kan.
Value of White Rocks.....J. M. Jackson, Topeka, Kan.
Buff Poultry .....Mrs. Alice McAnulty, Circleville, Tex.

Friday evening, at 7:30, the following program will be given in the College chapel:

Through Pipe-dreams to Success .....Geo. H. Gillies, Topeka, Kan.
Editor *Poultry Gazette.*
Commercial Poultry.....Representative of Swift & Co., Kansas City, Kan.
Barred Rocks.....A. C. Rait, Junction City, Kan.
A Texan's View of the Kansas Hen.... .....H. B. Savage, Belton, Tex.
Editor *National Fancier.*
Discussion: Should the Farmer Keep a General-purpose Fowl or an Egg Breed?. ...General-purpose Fowl, B. W. Smith; Egg Breed, W. A. Lamb
Farmers and Incubators.....Milton O. Adams, Hiawatha, Kan.
Feathers Off (illustrated with dressed birds)..J. H. Herbert, Manhattan, Kan.

Other programs of an extemporaneous nature will be arranged, at convenient times during the week, for those interested.

Two special features have been arranged for during the week. A student contest in poultry judging will be given in connection with the stock judging contest, being arranged for by the K. S. A. C. Agricultural Association. Details for this contest will be announced later. The other feature for the week will be a table poultry test.

The Agricultural College invites the poultrymen of the State to send to the College, not later than February 18, two hens in the best table condition possible. The hens are to be judged for their worth as table fowls and a report will be made of the respective merits. A competent judge will be secured, who will pass upon the birds, first as live birds, second as they appear dressed, and, finally, as served upon the table. Hens or grown pullets of any breed, cross on even mongrels, may be entered in this competition. The object of the contest is to determine the true value of the fowls as meat producers, both as to quantity and to quality. Send in two birds of your favorite breed, and if they have worth as meat producers this test will prove it. The College hopes to see this invitation responded to freely. Contests of this kind are new to the poultry industry of the West, but they are undoubtedly a step in the right direction. If you are interested in furthering the interest of the poultry industry in Kansas, go out into your yards and pick out two good hens and put them in table condition. Send all birds to Prof. D. H. Otis, Manhattan, Kan., to reach here not later than February 18.

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PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

Professor Bell, of the Wamego high school, visited College one day last week.

Assistant Shaw, of the Chemical Department, returned to College, Friday, after a week's illness.

The shops are repairing an engine for use in C. P. Dewey's stock yards, near the Rock Island depot.

Professor and Mrs. Clure gave an oratorical entertainment in the M. E. church at Garrison, on Friday evening, January 23.

Reverend Ames, the new minister in charge of St. Paul's Episcopal church, visited chapel and College classes last Friday morning.

Dr. N. S. Mayo made a trip to Harper county last week to investigate some herds in the interest of the Live Stock Sanitary Commission.

The Kansas Swine Breeders' Association will meet at the College from March 9 to 14. That is during the week of the swine breeders' institute.

The measles are abroad in the land. Several students have had a siege with the impertinent bacillus last week, but all have been victorious so far.

There will be special services this week on Wednesday and Thursday, at the Episcopal church. Bishop Millspaugh will preach on Wednesday evening.

The State Dairy Association will meet at the Agricultural College from March 3 to March 6, inclusive. The prospects are that it will be the best meeting ever held.

Professors Willard and Popenoe held institutes at Smith Center, Stockton, Cawker City and Clyde last week. Professor Dickens held the fort at Lasita, and President Nichols and Miss McIntyre attended an institute at Overbrook.

Seven bright young men from the eighth grade of the Coats, Pratt county, public school came here last Friday to visit the College and look over its facilities. They said they had heard so much about the "greatest agricultural school in America" that they felt like visiting it. All of them spoke of coming back in the fall to enter as students.

W. T. Pope, '98, horticulturist in the Normal and Training School of Hawaii, Honolulu, H. I., has an interesting article on horticulture in Hawaii in the January number of *Successful Farming*.

H. N. Vinall, of the senior class, has accepted a position with B. F. Stevens, the well-known nursery man of Crete, Neb., as a field foreman. He's several studies ahead of the course and intends to return before Commencement to graduate with his class.

The Hereford bull calf donated to the College by Frank Rockefeller arrived last Tuesday. He is a son of the second prize winner at the International Live Stock Exposition, at Chicago, and bids fair to become the aristocrat of the College bull pen.

Prof. D. H. Otis has started his poultry incubators so that they will hatch during the poultry institute. The whole "plant" is located in the old arched coal cellar west of the chapel. The room has been carefully cleaned and provided with ventilator shafts and a glass door, and makes a capital brooding cave.

C. A. Daggett, of Belleville, proprietor of the Scotch Plains Creamery, writes to Professor Otis: "The professors who were here at the institute left a good impression on the people. We have now effected a permanent organization." The institute was attended by Professors Dickens and TenEyck.

A careful count made of the students for the present winter term shows that the actual attendance is 1301, which is an increase of 192 over that of last winter. There are enrolled 148 preparatory students, 490 freshmen, 205 sophomores, 156 juniors, 65 seniors, 16 graduates, 22 specials, 38 dairy short course students, 124 farmers' short course students, and 37 apprentices.

Jesse M. Jones, member of the senior class, has left for Auburn, Ala., where he will become assistant in animal husbandry at the Alabama Polytechnic Institute, as the agricultural college of that state is called. He is several studies ahead of his class and expects to graduate with them in the spring. Mr. Jones is a young man of sterling qualities who deserves a good position and who will be an honor to it.

Governor Bailey has appointed Hon. R. J. Brock, of Manhattan, Regent of the Agricultural College, to succeed Sec. F. D. Coburn, of the State Board of Agriculture. Mr. Brock had been appointed to the same position two years ago by Governor Stanley, but owing to the passage of a law making the President of the College an *ex-officio* member of the Board, while the number of Regents remained fixed at seven, he resigned voluntarily to relieve the Governor from an embarrassing position. Mr. Brock is serving his third term as the county attorney of Riley county and is a talented and rising young man, who will undoubtedly make a model Regent. His appointment by Governor Bailey is an honor to the College as well, Mr. Brock being an alumnus of the institution.

The intersociety oratorical contest of the College was held in College chapel last Saturday night and resulted as follows: The first place was awarded to Miss Alice Ross, from the Ionians, and the second to L. S. Edwards, from the Hamiltons. The chapel was crowded to the last square inch, demonstrating again that a large assembly room is a positive necessity. There was much enthusiasm displayed by the ranks of the different societies, but the students of the Agricultural College always know how far to go and when to stop. The music was under the direction of Professor Brown.

There are a lot of newspaper writers in Kansas who are forever trying to make the public believe that the State Agricultural College is not what it ought to be in its tendency and instruction, but is drifting away from the purposes for which it was designed. Nothing could be farther from the truth. It is the largest and best agricultural school in the United States, holding closer to agriculture and the mechanical arts than most other state institutions of the same character. Year by year, step by step, it is approaching nearer to the ideal of a farmers' and mechanics' school, neglecting none of the other studies which are indispensible in a well-rounded, progressive American citizen.—*LeRoy Reporter.*

For over a year there has been a correspondence going on between the Manhattan Library Association and Mr. Carnegie in regard to a public library. While Mr. Carnegie was anxious to erect public libraries in large cities, he feared Manhattan was too small to properly maintain a free library. But the ladies never lost courage or quit work. They explained to him the rapid growth of the city for the past few years, its resources and the large number of young men and women who attend the Agricultural College who would be benefited by such a library. In answer to this Mr. Carnegie writes to Mrs. E. B Purcell as follows: "Responding to your communication in behalf of Manhattan, if the city agrees by resolutions of council to maintain a free public library at cost of not less than one thousand dollars a year, and provides a suitable site for the building, Mr. Carnegie will be pleased to furnish ten thousand dollars to erect a free public library building for Manhattan." The association already owns a splendid site, and the ladies have $2700 in the treasury and outstanding collections which will bring the sum up to $3500. The members of the library association are much pleased with the offer and our people generally are enthusiastic for the building, hence it is reasonable to suppose the council will pass the required resolution, as $1000 a year is as little as a free library can be maintained upon in a town of this size. Manhattan is an educational center, and the value of a free library is incalculable. We congratulate the old members of Manhattan Institute, who have been public benefactors, in their final triumph in securing for Manhattan a free library, and may they all live to enjoy for many years the pleasures and benefits of what has been a life dream to them for over twenty-five years.—*Mercury.*

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THE INDUSTRIALIST.

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INSECT ENEMIES OF THE EVERGREENS.

PINE INSECTS.

CONSIDERED as to the range of their usefulness in Kansas, the pines are our most desirable evergreens. As these conifers are all introduced from other localities, they have generally escaped the attacks of their insect foes native to pine regions, and have been considered entirely exempt. But even with these trees one may have too great confidence in the safety of his lawn favorites, as several species of insects of great ability as destroyers have found their way to our field without having disclosed the method of their introduction.

From the characteristic products of the pine—tar, resin, and turpentine—it might be supposed that insects would find its wood and bark uninviting, yet everywhere that the species of this genus are native, bark-borers are among their most troublesome and dangerous foes. These beetles are chiefly members of the well defined and widely distributed family of Scolytidae, and by uniformity of mode and place of attack they well deserve the distinction of their common name, bark-beetles. The general account of the life history of a bark-beetle here given may be applied with unimportant changes to almost any member of the group.

The beetles fly during summer, and after pairing, the female eats a round hole through the bark, straight into the sap wood. At right angles to the opening she excavates a tunnel under the bark, and in a general way in the direction of the grain of the wood. At short intervals along the side of this tunnel eggs are laid, from which the minute grubs soon hatch.

In many cases the parent beetle remains in the extremity of the burrow farthest from the opening, dying there, her eggs being all laid. The young grubs are short, compact, white, soft-bodied, resembling the larva of the curculio. As they grow, they feed outwardly from the parent burrow, their paths widening as the grub increases in size, and the neighboring larvæ not inter-

fering one with the other. As the grub attains full size its burrow becomes widened to the diameter of that made by the mother, and at the completion of larval life, the pupa state is assumed in the broader end of the burrow. Presently the pupa transforms into the beetle, which remains in the pupal cell until the color and hardness of maturity is attained. The beetles leave the cell under the bark through a circular opening, and as all the beetles of the entire brood make their escape not far from where they were hatched, the bark appears as if well peppered with shot, hence the name shot hole borers, which has been applied aptly to some of these pests. The effect of the burrowing of numerous large broods of these grubs in the vital cambium of the tree will be readily seen to be a serious checking of the growth, if not the early death of the infested tree.

No older or larger trees of the Scotch pine have I seen in the state than those on the home grounds of Mr. Barnes, at Vinland, and their owner is justly proud of them. But within a few years he has been alarmed by the presence of a bark borer that has destroyed some of the largest and finest specimens. On the occasion of a visit to his grounds a few years since, I had the opportunity of examining a tree recently felled, the bark of which was perforated in such a manner as to leave no doubt that the destructive insect was a Scolytid. Specimens were brought home, and examination showed them to be *Tomicus cacographus* LeConte, a species stated by that author to be a native of the southern and western states. The specimens from Vinland agree with the description except in their larger size, 3.8 mm. instead of 3.5 mm. LeConte notes, however, in connection with his description, that specimens in his collection from Illinois and Arizona are over 4 mm. long and do not seem otherwise to differ appreciably from the smaller eastern specimens of the species. Two specimens in my collection from Florida are of the small eastern race.(3 mm.) Of this and allied species Zimmerman says that "they live mostly under the bark of coniferous trees and do immense mischief by killing the trees in the forests of pine and fir: as was the case with the present species in Carolina in 1847-49." The mine of this species, according to Packard, is unlike that of our more common bark borers in having but one set of larval galleries. He further states that this insect infests the southern pine in Georgia. An interesting note in Insect Life,

Vol. 6, states that this species, with others, was taken alive in Chicago in 1893, resting in the windows of the Forestry Building at the World's Fair, it being impossible, of course, in that case to determine the source of the insect. Such instances offer the suggestion that the pest may have been introduced into pineless Kansas through the importation of southern timber.

As beetles have been taken alive from the wood in October and March, it seems likely that this insect hibernates in the adult state, and importations of recently cut southern pine timber with bark remaining, should be carefully examined to detect the presence of this insect, and if discovered it should be effectually destroyed before escaping in any locality where pines are planted.

The species is described as follows: Beetle about $3\frac{3}{4}$ millimeters (.16 inch) in length, cylindrical, about one third as wide as long; the thorax extended hood-like over the head; the tip of the wing covers sloping at an obtuse angle with the line of the back, the sloping area beset at its edge with small spines, five in number on each side, the central one longest; antennæ short with an ovoid club at tip; legs short; color a resin yellow, darker in some specimens.

OTHER PINE-BORERS.

Three or four other pine-borers, presumably introduced, have been reported as occurring within the State, all of which, where native, are important enemies of the pine. As none of these have shown themselves in sufficient numbers to be otherwise than rare in collections here, it is probable that they have not gained a permanent foothold. There is no reason, climate considered, however, that once liberated at the proper season in the vicinity of groves of large pines they might not become established, to the great damage of these noble trees.

Two of these are Buprestids, belonging to the same family as the ubiquitous and dreaded flatheaded borer of the apple tree. But as they are several times larger than that native species, and are proportionally more destructive, the results of their attacks where they are at all numerous, may be readily foreseen.

One of these, a common species in pine regions to our eastward, is the large pine flathead borer, Chalcophora virginiensis, reported by George P. Cooper, as taken at Topeka; the other the Colorado representative of that genus, Chalcophora angulicollis, reported by Prof. F. H. Snow as occurring in Western Kansas.

These two species are so nearly alike as to require no separate description here. They should be easily recognized by their general resemblance in form and action to the well-known flathead apple tree borer, but they measure from an inch to an inch and a quarter in length, with proportional width, and the body is more brightly bronzed and more smoothly polished than in our small species, the upper side being distinctly sculptured with elevated spots and lines more highly polished than the rest of the surface.

Where native, these large flathead borers are undoubtedly very destructive to the pines that they infest. The larva is nearly two inches in length and probably lives the greater part of the year in the wood, from which the adult makes its way during the summer. Like our native flathead, the beetles of these species are fond of running over the bark of the tree in the bright sunlight, and they are believed by eastern observers to feed upon the young buds of the pine, thus doing a doubly destructive work.

The lesser pine-borer of Packard's Forest Insects, Asemum moestum, has been taken in several localities in Kansas, and is possibly a native, though if so, its native food plant has not yet been discovered. In pine forests in the north eastern states it is a common insect, and its transformations have been described by Doctor Packard. This beetle is a member of another family of tree pests, the Cerambycidæ, to which belong the various round-headed borers, and its larva resembles in general the common grubs split from the hickory and hackberry at the woodpile or that taken from the base of the apple tree in our eastern counties, being but little over half the size of these however. Its burrows "extend up and down under the bark or plunge deeper into the wood." The adult beetle is a longhorn, from a half to three-fourths of an inch in length, the antennæ about half the length of the body, the thorax rounded, the wing covers with sides nearly parallel, rounding behind. In color it is a medium or dark brown, the lighter specimens with a reddish shade.

The last species of pine borer to be noted as occasionally occurring with us is another Cerambycid, or longhorn, and one well meriting its common designation, as its antennæ are over three inches in length or nearly two and one half times the length of the body. This beetle is a striking insect and is not likely to be mistaken for any other. Its legs are long and slender, the anter-

ior especially lengthened in the males. It measures about one inch and a quarter in length, the head is vertical, the thorax with a prominent spine on each side before the middle, the wing covers tapering slightly from the shoulders backwards. The color of the insect is a brownish gray with short lines and spots of black placed with little regularity over the wing covers.

This beetle, Monohammus confusor, is commonly known in its larval state as the "sawyer," in southern pine regions, and has been found to be very destructive to pines and firs where native and abundant. It is a roundhead, and measures when fully grown nearly two inches in length, attacking old and young trees alike, and so abundantly, states Doctor Packard, that a piece of spruce bark six inches square, showed eighteen holes through which beetles had escaped. The larva apparently lives two years in the tree before maturing as a beetle, and the adult appears in June, soon thereafter laying eggs from which come its successors.

It scarcely needs urging, one would think, that the efforts of tree lovers in our State should be continually exerted to discover any attack of these occasional visitors upon the evergreens in our groves or lawns, and to prevent their maturity and distribution here.

THE PINE SCALE LOUSE.

An insect of quite a different nature from any of the foregoing, and from its sedentary habits and slow dispersion of less formidable character, though from its small size more easily escaping notice, is the white pine scale louse, Mytilaspis pinifoliæ, which has been sent me, taken from growing trees in several parts of the State. This scale can be so easily imported from eastern nurseries, and by the evidence of the cases observed can become so readily established here, that some notice of it should be taken by planters of the pines subject to its attacks. This scale occurs upon the leaves or needles sometimes so abundantly as fairly to whiten them, its persistent extraction of the sap for food causing the foliage to yellow, and die, and unless the tree be relieved of the perennial drain upon its strength it will finally die completely.

This insect may be readily known among those inhabiting pine trees by its position, lengthwise of the needle or leaf, by its color, a waxy white with a pale yellowish spot at the narrow end, and by its form, which is a long pointed oval, it being in the male about

three times, in the female about five times as long as its greatest width. In the specimens that I have examined from the narrow leaves of the white pine, the form is fairly straight and regular. Riley states however, that on broader leaved species, the insect becomes broader bodied and more curved. It attacks by preference young trees, and necessarily on account of the finally deciduous character of the pine leaves, it maintains its position by selecting as the place of its maturity the newest leaves at the growth points.

It is at least two brooded, hibernating as an egg under the mother scale. The egg is blood red in color and hatches in spring into the minute, red, and actively crawling larva, which travels to the fresh growth and soon establishes itself and begins the secretion of a scale.

It is reported as occurring in abundance not only upon the white pine, which seems to be its favorite food plant, but also on the red pine, the Bhotan pine and the yellow pine: while it also affects, though less abundantly, the Scotch and Austrian pines and the dwarf pine.

Though attacked by several of the usual scale enemies, including a minute parasitic four winged fly, and the larvæ of several lady birds, it is evident that the scale insect will multiply to an injurious extent in spite of these, and that some decisive means for its destruction must be taken, when the insect appears and flourishes as it does in the case that I have observed. As the pine needles or leaves retain their leaf function for more than a single year, it will be necessary when experimenting with destructive sprays or washes, to proceed with caution, lest the remedy be found worse than the disease. Riley found by experiment with a number of white pine trees, doomed otherwise to an early death, that the actual removal of the leaves with the infesting scales could be done with subsequent recovery of the tree, if performed at or immediately after the time the new year's growth begins. This being true, it will no doubt be found possible to apply a spray deadly to the insects or their eggs, just before growth in spring with no more doubtful result. Tree buyers should be warned, however, of the danger of planting infected trees and with conifers no less than with other ornamentals, or with fruit trees, they should scrutinize with suspicion all shipments at their unpacking, and this, let me insist, none the less because the box bears an inspect-

or's certificate, as I observe that many trees are shipped under a certificate that by no interpretation can be made to cover that special lot.

SOME RED CEDAR INSECTS.

While I consider the red cedar one of the most doubtfully desirable trees planted on Kansas farms where any other evergreen will grow, it remains true that the tree has served many a good purpose, and like Ben Davis, has a warm place in the heart of the Kansas planter. It is hardy, equal to almost any demand for this quality, and will succeed where the planting of any other evergreen would be a well nigh hopeless experiment. With a proper selection of thick foliaged individuals, it is certainly a beautiful tree through the spring months. It stands clipping well, a fact that endears the tree to the hedge planter and to that mistaken man who has the wish to see trees in unnatural and bizarre shapes on his lawn. But it is a menace to the apple orchard and to several valuable lawn trees and shrubs, through its serving as a center of infection for the rust of the leaf in those trees; and during the dry after part of summer and the entire winter, it requires a lively imagination, in my opinion, to see beauty in its rusty black and sombre foliage masses.

However, as it is widely planted, and doubtless will be in the future, it is well to observe that the red cedar, like the pines, is not destitute of its insect foes in our State. Some of them of considerable importance. Most usually noticed of these is a mite like the greenhouse *red spider* that attacks trees of all sizes, especially in dry seasons, sucking the sap, and by their thirty millions making very evident inroads upon the vitality of the tree. These mites further spin abundant fine webs over and among the infested leaves, which catch the flying dust until the tree is of the color of the road or of the soil of the field, and whatever beauty the tree may have had is thus effectually obscured. Although this pest is occasionally very abundant and conspicious in our State, and presumably elsewhere, I find almost no reference to it as a destructive insect, and no suggestion as to its suppression further than that given by Comstock in his Manual, in which it is stated that the red mite on fruit trees may be combatted with any of the washes found useful against scale insects. Forbes in his Third Illinois Report, relates his success in destroying the red spider on larches by the application of kerosene emulsion, two

and one-half per cent of the oil, but in our own trials with this and other sprays some difficulty was found in insuring the liquids reaching the insects under the matted and dusty webs. In seasons of ordinary rainfall this mite is not troublesome.

The second leaf pest of the red cedar is less widely distributed, but when present more persistent in its attacks. The *evergreen bag worm* occurs in many of our eastern counties but more commonly in those of the southeastern section of the State. It attacks all of the fine leaved evergreens and several deciduous trees and shrubs. But it is more likely to remain unnoticed upon the evergreens because of their persistent foliage, by which the otherwise conspicuous cases of the insect are more or less concealed.

The bag worm receives its name from its uniform habit of constructing as a protection both to itself and its pupa a silken case covered outwardly by leaves and twigs of the tree infested. These cases measure two inches or more in length when of full size, and are fastened firmly to the twigs and branches by a silken band at the tip. When moving by necessity from place to place for food, the larva cuts the band and with its anterior segments projecting from the mouth of the case, drags it about, fastening it again when desired. On reaching maturity the worm finally anchors the case to the twig, and retreating within it, transforms to the pupa. The male moth is winged and emerges in due season, flying to seek the female, which is wormlike in form, absolutely footless and wingless, and devoid of ability to travel away from the place where her case is fixed. After pairing, the female dies, and her egg mass remains in the case, passing the winter on the tree. The young worms hatch in the spring and for awhile travel actively enough, constructing cases for themselves as soon as they begin to eat.

From their habits it is evident that a tree once infested and not relieved of its permanent enemies will soon become covered with them, and with the red cedar the loss of its leaves during the season of growth, being not open to repair, leaves the tree each year in poorer condition, and it must finally die. Since the entire brood must hibernate in the egg, within the cases upon the tree, there is at once suggested the readiest mode of destruction, *i. e.* the removal of the sacks with their burden of eggs during the winter season. Where a locality is little infested, the cases may be

burned at once, but as the several important parasites of the worm are also thus destroyed, a better suggestion, perhaps, is to place the cases on the ground in an open space away from shrubs and trees, to allow the friendly insects a chance to mature and fly away. I have bred from cases of this worm, taken at Parsons, numerous specimens of a four winged fly, Hemiteles thyridopterygis. As the larvæ are strictly external feeders, like any other caterpillar, they may be also readily destroyed, and on a larger scale, by the application of arsenical poisons in spray at the time when the young larvæ are traveling, which will be with us in late May or early June.

A third leaf feeder attacking the red cedar in Kansas is the *red cedar saw-fly*, Monoctenus unicolor Marlatt, for the facts concerning which I have drawn upon the records of the Kansas Experiment Station, where the species was discovered and its food habits ascertained.

This saw-fly appears as an adult in early spring and individuals of both sexes may be observed the latter part of April flying about the tree, or by sweeping its branches may be captured with the net. The insect measures not far from three-tenths of an inch, or a little larger than the common housefly. It is four winged, and the broad abdomen is attached by its full width to the thorax. The male is shining black in color with a few yellow markings, the legs also yellow. The female is a little larger than the male, is of a yellow color with a few black markings on the thorax, and on the under side of the abdomen at the tip, has an ovipositor, two-bladed, and with serrate edges, the instrument when not in use being concealed in a slit in the body. By means of this ovipositor, a fissure is opened in the twig and an egg laid therein, many eggs being laid on the tree but on different twigs. The larvæ when hatched eat the leaves and ends of tender twigs. They reach finally the length of an inch, are caterpillar shaped, with twenty-two legs, the body is smooth and glossy, and of a greenish color with three lines of dark gray extending from end to end along the back and sides. When abundant, they are readily seen, or even conspicuous on badly infested trees. When full fed, in July, the larvæ enter the ground, there spinning their silken brown cocoons, with crimson linings. In these they remain unchanged until near the time of the appearance of the adult the next spring.

As this larvæ is mandibulate and surface feeding, it will be

readily subdued by the application of the usual sprays, and kerosene emulsion will prove equally effectual against it.

At different times, and from widely separated localities through the State where the red cedar is planted, I have received specimens of injured wood and the insects responsible therefor, which showed the *cedar bark beetle*, Phloeosinus dentatus, to be well distributed. This insect in general habits is closely similar to the pine bark beetle described above, and like it, is capable of doing great and rapid injury to the tree attacked. In the cases coming under my observation, the insects were so abundant in a cedar tree and their burrows in consequence so numerous that the connection of wood and bark was completely severed. In some cases the source of attack was believed to be from imported cedar posts, and the insect has been found several times in cedar posts imported from states to our southeast. As the red cedar is a common native in rocky ravines through our State, however, it is likely that this bark-beetle is a native also, and where the conditions leading up to the attack have been shown, it seems likely that the beetles have been attracted to the trees by some untoward circumstance, as undue checking by pruning, recent transplanting, or lack of vigor in a dry summer. Owing to the similarity between this beetle and the pine inhabiting species of the same family, a course similar to that recommended for the preceding should be adopted for the control of this species.

Lastly, I may note the presence of two roundhead borers, Hylotrupes ligneus and Callidium antennatum, that I have taken abundantly in past years in Riley county, and know to occur in other parts of the State. The first of these may be called the two-spotted cedar borer, the second the black horned cedar borer, and the following brief description will suffice for their recognition.

The two-spotted cedar borer measures usually from a half to three quarters of an inch in length, and about one-fourth as wide as long. One very small specimen in my possession measures but little over one-fourth of an inch in length. The thorax is round, rather narrower than the rest of the body, the upper surface is roughened, and has two elevated smooth spots before the middle, with three irregular elevated smooth lines extending backward, the wing covers are parallel at sides, rounded toward the tips, the antennæ are about as long as the body in the males,

and about half the length in the females. The color of the insect is black, the wing covers a light or dark yellow, with a large spot on each before the middle, and the tips broadly black or very deep blue.

The black horned cedar borer is an insect of about the same size as the preceding and of much the same form, but it differs strikingly in color, being all over a deep Prussian blue of a darker shade on the thorax, the antennæ being black.

These species are associated it their attacks upon the red cedar, laying eggs in the bark. The larvæ with a general resemblance to the roundheaded borers well-known. Their work is largely in the outer layers of the sap wood and they are very destructive where common.

From the frequency with which these insects are bred from imported red cedar posts, it might be considered that they are not native, but the circumstances under which they occur in Riley county assure me that they must be either truly indigenous or else long since introduced.

E. A. POPENOE.

The State Agricultural College at Manhattan has asked the Legislature for appropriations aggregating about $327,000 for the next two years, and there is quite a general feeling among the members that the College should have all it asks. While it may not be generally known, Kansas has the largest Agricultural College in the United States. But the trouble is, it is not given appropriations anything like those received by the institutions of other states, which are much smaller, and as a result it is seriously handicapped in its work. One thing which shows the need of larger appropriations is the fact that within the last year over thirty professors and assistants at the College have gone to other institutions because they have been offered larger salaries. The State Agricultural College of Kansas has 51 teachers and professors, 1396 students enrolled last year, 323 acres of land, property of all kinds valued at $548,178, and an annual income of $99,000. The State Agricultural College of Michigan has 58 professors and teachers, 688 students enrolled, 683 acres of land, property valued at $609,115, and an income of $225,000. The comparison between the number of students at the two institutions, the number of instructors and the annual income is rather startling.—*Daily Capital.*

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PROF. J. D. WALTERS.....Local Editor
PROF. J. T. WILLARD.....Alumni Editor

LOCAL NOTES.

Professor Webster attended farmers' institutes at Gorham and Hays last week.

Doctor Mayo and Miss McIntyre attended farmers' institutes at Wellsville and Cadmus last week.

The College basket-ball team was defeated in Topeka by the Y. M. C. A. of that town by a score of 52 to 5.

The second-year students of the agricultural course will furnish the program for one evening of the dairy convention.

The pay-roll for January amounted to $6917.84. Of this the professors and assistants received $5224.98, the employes $464.03, and the students $1228.83.

The Department of Animal Husbandry has received a young pure-bred Hereford heifer, purchased from the well-known Hereford breeder, J. M. Foster, of Topeka.

Regent McDowell and Professor Otis left February 1 on a trip to Missouri, Iowa, and perhaps other states, to visit a number of high-grade Shorthorn herds, with the view of purchasing additions to our Shorthorn herd.

This week the Farm Department will begin a series of corn-judging demonstrations which will be attended by all agricultural students. The work will be done in the large arena in the College barn, and visitors are welcome.

The Department of Animal Husbandry has a good offer for the Guernsey bull, "Shylock of Darlington," who stood at the head of the College Guernsey herd for the past four years. The animal is a perfect specimen in many respects.

The steer-feeding experiment now being carried on in the College feed yard is again demonstrating the high feed value of corn ensilage. The group of ten two-year-old steers fed with ensilage is out-gaining those fed with alfalfa. Both are receiving the same amounts of grain and equal treatment.

The Manhattan city council has passed a resolution accepting the $10,000 gift from Andrew Carnegie to build a free public library in Manhattan, and agreeing to maintain it at a cost of not less than $1,000 per year and furnish a suitable site. At the same meeting the council sold the old city buildings, and work will soon begin on a new $10,000 city hall for Manhattan.

Died, on February 3, of congestion of the brain, at the home of his parents in Manhattan, Gerry Putnam. The deceased was a bright and well-liked member of the freshman class and a brother of Miss Abbie Elida Putnam, '02. His remains were buried on Friday afternoon, February 6, many of his College friends going with them to the cemetery.

In calling the roll in the rhetoric class, Professor Brink noticed that Mr. Selig had been absent for several days and wanted to know if he had the measles, when a member of the class informed him that the absent one had quite recently been married. The professor looked astonished and exclaimed: "Well, that's the end of Selig."—*Students' Herald.*

The College laboratory for the preparation of poison for prairie-dogs and pocket-gophers is sending out large quantities of the mixture every day. Prof. D. E. Lantz reports that for the past two or three weeks over one thousand cans were sold per week, and that the number of orders is likely to increase toward spring. Over nine thousand ounces of strychnine were used for this purpose during the past year.

William C. Turner, a student doing special work in the machine shops of the College here, has received an appointment as machinist in the United States navy, and reported for duty at Topeka last Friday morning. Mr. Turner is a splendid specimen of physical manhood and a fit subject for residence on one of Uncle Sam's great war ships, where he will be stationed.

The butter-scoring contest between Kansas creameries, conducted by the Dairy Department, will begin with the butter sent to the State Dairy association. It will be exhibited at the College, after which it will be analyzed by the Chemical and Bacteriological Departments. It will be graded on flavor, body, color, salt, and general appearance. The scientific tests will establish the exact amounts of water, butter fat, casein, salt, and bacteria.

President Nichols was in Topeka Thursday and Friday of last week, looking after the interests of the College. He reports a very satisfactory preliminary hearing before the ways and means committee of the senate and a general feeling among the legislators favoring all the needed appropriations for the College. This institution has never made a practice of asking for more than it must have to carry on its growing work, and the State knows that its affairs are well conducted.

In the past three or four years the College has had among its students Russians, Turks, Syrians, Mexicans and Indians. The latest acquisition is a full-blood Filipino, Federico Sarabia, a bright and handsome young man, 16½ years old, who came over here with the family of an officer now stationed at Fort Leavenworth. Senor Sarabia can not speak English fluently, but he has a certificate from the Jesuit college in Manila showing that he studied Spanish, Latin, Greek, algebra and history at that institution.

That Kansas State Agricultural College men are in demand is shown by the numerous calls that come here for men who are able to grapple with the difficulties they encounter, and not only to grapple but to win. W. L. Milner is another of our students who leaves College to accept a position. He will go to Oklahoma as draftsman for one of the large Kansas City concerns. His initiatory salary, we are told, is something like seventy-five dollars a month.

ALUMNI AND FORMER STUDENTS.

D. W. Randall, '99, has a position as draftsman with the Arkansas Valley and Western Railway Company. He is located at Perry, Okla.

E. A. Powell, '96, who has been farming near Osage City, has been obliged to go to Albuquerque, N. M., on account of ill health. His friends will learn with regret that he is not much benefited by the change.

C. V. Holsinger, '95, of Rosedale, stopped over last Thursday on a business trip to Colorado. He reports his three girls and Mrs. Olive Wilson-Holsinger, '95, in good health and the big Holsinger fruit farm in a prosperous condition.

Minnie L. Copeland, '98, has been appointed superintendent of the Globe Hospital and Training School, at Freeport, Ill. Her many friends will be glad to hear of this recognition in her chosen work. Her energy and executive ability will doubtless insure continued success in this larger field.

H. A. Avery, '02, has entered mercantile business with his brother in Wakefield, Kan. Since graduation he has been employed by the Mechanical Department, chiefly in working on the laboratory tables, hoods and shelving of the Chemical Department, where he has given most acceptable service.

The Rumford Committee of the American Academy of Arts and Sciences has made a grant of $250 to Professors E. F. Nichols, '88, and Geo. F. Hull to assist them in their research on the relative motion of the earth and the ether. Professor Nichols is fast obtaining recognition as a most acute investigator.

A son arrived at the home of the editor [A. B. Kimball, '89] Friday, January 16, in time for early breakfast. Inasmuch as his mother had had him named for several years he did not come into the world nameless, but answered at once to the cognomen of John Melville. He is the fourth generation of the family in Kansas and the name John occurs in each. He is the only male representative in the Kansas branch of the tenth generation of the family in America. Needless to say, he was cordially welcomed and at once made himself as much at home as a kitten under a warm stove.—*Scandia Journal.*